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A Comparison of Protective Services Commonly Used for Rail Shipments of Florida Oranges and Grapefruit

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A Comparison of Protective Services Commonly Used for Rail Shipments of Florida Oranges and Grapefruit

This is a report on more than 600 citrus shipping tests from Florida over a period of three shipping seasons beginning in 1948. It presents a comparison of load-temperatures obtained during transit by commonly-used protective services grouped by shipping periods, and the effect of such temperatures on the keeping qualities of the fruits during the transit period and for a week after it reached market. The evidence presented herein should assist most shippers in selecting the protective service most feasible for his needs, and usually should make possible a considerable saving in money.

Even some veteran shippers are not well posted on the relative efficiency of the several protective services in general use. Although there are many reasons for this, the most important are: (1) Few shippers have a clear idea of the approximate amount of heat a bunkerful of ice may be expected to remove from a carload of fruit, or the probability of fruit freezing in a car under ventilation when outside air temperatures are well below 32° F.; (2) the absence of adequate data correlating icing and ventilating services with resulting temperatures in transit; and (3) the effect of these temperature differences on condition of the commodity during the marketing period.

A fact that is confusing is that frequently there is no great difference in temperature at unloading time regardless of whether the fruit was shipped under the most expensive refrigeration service, some of the less expensive ones, or even under ventilation. For example, in a few shipping tests to New York during the fall of 1948, test cars were shipped under standard refrigeration (several re-icings en-route at a cost of $63.48 per car) and others under a free service designated as Item 80, Section 2 (initial icing and one re-icing). They had essentially the same temperatures. The same was true in tests to Pittsburgh using standard refrigeration at a cost of $90.60 and initial icing and one re-icing at a cost of $60.84. Recognizing the possible savings in refrigeration costs, the Florida Citrus Exchange, and other interested agencies, through the Growers and Shippers League of Florida requested that the U. S. Department of Agriculture: (1) resume its transportation studies without delay and expand them to include comparisons of the commonly-used protective services as affected by car types and loading methods; and (2) repeat the tests often enough to establish a basis for recommending a transit refrigeration schedule that is safe and not unnecessarily expensive (one which can serve the shipper in much the same manner that spray schedules serve growers).

NEED FOR REFRIGERATION

The main purpose of refrigeration in transit is decay control, so a brief review of the relation of temperatures to the development of rots in Florida citrus fruit is desirable. Fortunately, temperatures low enough to control effectively the development of fungal rots also retard the development of rind breakdown such as pitting, commonly found in the Pineapple orange, and aging which is most pronounced in the Valencia during the latter part of its shipping season. During much of the shipping season, outside air temperatures north of Florida are low enough to cool fruit rapidly during transit, thereby retarding decay without the cost of refrigeration.

Most of the spoilage in fall shipments of Florida fruit is stem end rot caused by the fast-growing diplodia fungus. The optimum temperature for growth of this fungus is about 86° F. It is stopped at 50°. The principal cause of rot in winter is green mold which develops within a week or two after harvest. This fungus grows most rapidly at 75° and can cause decay in 3 or 4 days. It can grow at 35° to 40° or even some at 32° but is retarded at 50°. In late spring, the ever present phomopsis fungus causes most of the stem end rot while in winter it is commonly the cause of decay in oranges that escaped green mold. The relatively slow-growing organism makes its best growth at 73°, but its growth is also retarded at 50°.

Holding tests repeated many times at Orlando with commercially-packed oranges have shown that there is little likelihood of decay developing within a week or 10 days in oranges held at 50° F. or somewhat cooler.

NORMAL OUTDOOR TEMPERATURES ENCOUNTERED IN TRANSIT

A review of normal temperatures along the route should be considered, especially if the most economical, safe refrigeration-in-transit service is to be determined.

The average monthly temperatures along the routes to the East and Midwest markets and the average minimum monthly temperatures are shown in Figure 1. The temperatures at Birmingham and St. Louis ran too closely parallel to those of Atlanta and Cincinnati respectively, to be shown clearly on this graph. It is seen that the average temperature at points north of Raleigh and Nashville is below 50° F. from November to March. Hence, ventilation during the northern part of the transit period can be utilized advantageously in winter.

Average minimum temperatures do not reach the danger level, that is below 30° F., even in the coldest months until the cars have gotten north of Richmond or Nashville. Hence, ventilation service in lieu of re-icing may be indicated through a part of the south at least during the cooler months if the train schedules put fruit cars in that area during the night.

The 30° F. average minimum monthly isotherm for January shown in Figure 2, passes fairly close to Richmond and Lynchburg, and north of Knoxville, Nashville, and Memphis, the principal gateways through which pass most of the shipments from Florida to the East and Middle West. This isotherm is of considerable significance in arriving at the point beyond which caution must be exercised when ventilation is being considered as a substitute for bunker ice. The 26° isotherm is given to show it runs quite a few miles north of the 30° isotherm.

When outside air temperatures are about 25° F. the likelihood of freezing fruit while moving under ventilation is not great unless the exposure is long. That air temperatures well below 32° can be tolerated longer than most shippers assume was pointed out in H. T. & S. Office Report No. 277. The range and average number of days each winter month that the minimum temperature fell below 25° and 20° at these cities over a 10-year period is shown on Figure 2. The number of days with risky low temperatures varied considerably from year to year. Only in unusually cold weather is freezing damage likely to occur in shipments under ventilation while they are south of the 30° isotherm. A ventilation service more effective than standard ventilation is now available from Florida to points near this isotherm under the provisions of Rule 385 pt 3 (10) (vents closed at 25°, open above 25°). This service is currently applicable from Florida to designated points south of the Virginia-

North Carolina line, and the Tennessee-Kentucky line. North of this line the only ventilation service offered is that provided for under standard ventilation in which ventilators are closed at 32°, opened above 32°.

TRAIN SCHEDULES

A car loaded in central Florida on Monday is usually in that general area until midnight. On "regular schedule," billed to the East, this car should be near Savannah, Ga., Tuesday midnight; in Potomac Yards, Va., 24 hours later and at least as far north as New York, N. Y., by Thursday night. If the shipment is made to the Midwest, the car should be in central Georgia midnight Tuesday, north Tennessee or Kentucky Wednesday night, and in Cincinnati, St. Louis or near Chicago, Detroit or Cleveland, midnight Thursday. Thus by the second night after loading, or soon thereafter, the car (whether going to the East or Midwest) should be in or near a cool belt where the average monthly temperature is 50° F. or below during at least part of the winter. Normally, there is about a 10-degree reduction in average temperature during each of the two following days and by the morning of the fourth day after loading, the car should be at or near the principal eastern markets.

A car on the advanced, or "third morning sales," schedule spends its first night in Florida; the second night between southern South Carolina and central Virginia; and delivery should be expected during the following day.

EXPERIMENTAL PROCEDURE

These shipping tests were made with commercial loads going to market under normal conditions of handling and under a regular transportation schedule and were planned to show the comparative rate of cooling obtained from the different services, the amount of ice remaining at unloading in the bunkers of the cars given modified refrigeration, and amount of decay that developed in sample lots of fruit during and after transit. Cars regularly furnished to the shipper were used, and while no attempt was made to choose the best cars, those in poor condition were avoided. When fan cars were used, the fans were sealed in the "On" position during loading and special instructions to "Keep Fans On To Destination" were placed on the bill of lading.

The load in each standard test car consisted of nailed or wire-bound crates containing the usual assortment of sizes and grades, usually medium-size oranges or small-size grapefruit. A Ryan recording thermometer was placed in the center of the test crate which was loaded in the top layer centerline near the doorway of the car. In the case of double-deck cars loaded with oranges mostly in 5-pound open-mesh consumer bags, the test bags (one of which contained the recording thermograph) were put in open-mesh bailers and placed near the top quarterlength position and covered by only one layer of small consumer-size bags. An inspection was made of the fruit, (about 90 pounds) in the test packages upon arrival at destination and after holding for one week at room temperature.

Mainly for the purpose of accumulating mass evidence, many of the important comparisons were repeated 10 to 15 times. This procedure made it possible to include in the tests, fruit produced in different areas, fruit at different stages of maturity and shipments made under varying weather conditions.

The kind of protective services used during this study were varied according to the outside temperatures. These services were:

Standard Refrigeration - Initial icing and re-icing to capacity at all regular icing stations.
Rule 240 - Initial icing only, either before (pre-iced) or after loading.
Rule 251 - Initial icing plus one re-icing in transit.
Half Stage Icing - Raising bunker ice grates to half-way position, providing 50% in capacity of full bunker. Cost is 78 percent of full-bunker service for any of the bunker icing services provided.
Item 80, Section 1 - A free icing service restricted to certain markets and load weights. Similar to Rule 240 (initial icing only.)
Item 80, Section 2 - A free icing service restricted to certain markets and load weights. Similar to Rule 251 (initial ice plus one re-icing.)
Standard Ventilation - Rule 385, Part 1. Vents closed at 32° F., open above 32°.
Combination Ventilation - Rule 385, Part 3 (sec.10) Close vents at 25°, open above 25°, to specified station south of northern boundaries of North Carolina and Tennessee and east of Mississippi River; standard ventilation beyond.

Some shipments consisted of two of the above protective services, such as Rule 240 followed by combination ventilation or a modification of a service such as Half-stage Standard Refrigeration.

RESULTS

PRECOOLED LOADS

Room precooled fruit. Fruit that is room-precooled prior to loading should have a temperature of about 40° F., certainly below 50°. Late spring and early summer shipments of crates of room-precooled oranges and grapefruit loaded in both non-fan and fan cars, showed that initial icing (Rule 240) supplied adequate refrigeration for 4 or 5 days, Figures 3 and 4. Although fan cars gave more uniform temperatures, they were not vastly superior to non-fan cars. Fan and non-fan cars given standard refrigeration and Item 80, Section 2, are compared directly in Figure 5. In exceedingly hot weather it may be desirable to replenish the ice supply at shipping point, or to re-ice the second or third day in transit, if the car is to be held several days before unloading. The shipper who feels that standard refrigeration is safer can save 22 percent of refrigeration charges without sacrificing protection by using stage icing standard refrigeration. (See also H. T. & S. Reports No. 279, 280, and AAR-USDA Test 2)

Car precooled fruit. Crated fruit precooled for 6 hours with bunker ice in a fan car in May, Figure 6, cooled only about 15 degrees to a temperature of about 65° F. The bunkers were replenished with ice a few hours after leaving the shipping point. Cars with the non-precooled loads were iced at the same time. The precooled loads were cooler than the non-precooled loads throughout the transit period, although the difference in temperature lessened as the transit period lengthened. (See also H. T. & S. Report No. 263)

The rate of precooling of bagged fruit obtained by a mechanical unit mounted on a truck (Produce Conditioner) was not uniform. In a few instances, Figs. 7 and 8, very little cooling was obtained while on other occasions, Figs. 9 and 10, the rate of cooling approximated that obtained from bunker ice. Precooled fruit, shipped with initial and 2 re-icings in transit in May had about 10° F. lower transit temperatures than non-precooled fruit shipped under the same service. (Fig. 9) Car precooled fruit shipped in January and February with initial ice only had much lower temperatures during the first 2 days than non-precooled fruit receiving an additional re-icing in transit. (Fig. 10)

A comparison of containers showed that oranges in open-mesh bags cooled more rapidly than those in windowed paper bags ("Vent-Vu") during the transit period. (Fig. 8)

The rate of precooling of citrus after loading was also discussed in H. T. & S. Reports Nos. 277, 279 and 280. The records presented in those reports and here give a good picture of the temperature reduction that may be expected when warm citrus fruits are precooled in the car with mechanical cooling units or with ice. Precooling for 6 hours with a mechanical unit in good condition removed about as much heat, 14 to 16 degrees, from the load as did a bunkerful of ice. By either means of precooling, the commodity is not likely to be much below 55° or 60° F. after 6 hours of precooling even if the commodity is fairly cool when loaded.

In general, the records show that (1) warm loads in pre-iced cars precooled with bunker ice and permanently installed car fans, should have the bunkers replenished at loading point or re-iced in transit not later than the day after loading. Rarely should more than 2 bunkers full of ice be needed for shipments of 4 or 5 day duration. During the cooler months ventilation may often be substituted for the second bunkerful of ice; (2) warm loads in "dry" cars precooled with a mechanical unit, should be initially iced at the first icing station reached enroute. Whether to re-ice or convert to ventilation later would depend upon outside temperatures and/or fruit condition.

NON-PRECOOLED LOADS

Under usual working conditions, a ton of ice is not likely to reduce the temperature of a 50,000 pound load of warm fruit more than 3 or 4 degrees. It is evident that 3 or 4 tons of ice does little more than partially cool a carload of warm fruit. By knowing the temperatures of the commodity at loading and the amount of ice supplied, one can forecast with reasonable accuracy what the commodity temperature will be when the first supply of ice is melted.

Fruit in crates. In late fall and winter, initial icing and one re-icing gave as satisfactory temperatures as did standard refrigeration. (Fig. 11) Similar results were obtained in the January-February, March-April, and May-June periods in fan cars, but in non-fan cars standard refrigeration gave somewhat lower temperatures than did one re-icing. (Figs. 12, 13 and 14)

As summer approached, loading and delivery temperatures rose regardless of protective services. It is essential to replenish the bunkers of non-precooled loads at shipping after loading. If this is done and the cars are re-iced the second morning after loading, temperatures approximating those obtained from standard refrigeration should be expected for 4 or 5 days. If the bunkers are not replenished at shipping point, but re-iced the second day after loading, most of the initial ice will have melted before the car gets out of the state, and cooling will have slowed down or even stopped before the car is re-iced.

The fan car cooled the load more rapidly in transit than the non-fan car. This fact was re-affirmed in H. T. & S. Reports Nos. 277, 279 and 280, and AAR Test 1, which also gave a detailed rate of cooling in 10 locations in each car, and was further supported in Report No. 282. More significant is the fact that regardless of the date -- from fall to early summer -- one re-icing of fan cars gave better transit temperatures than standard refrigeration of non-fan cars.

No practical difference in results were noted between cars pre-iced and those initially iced at the first icing station reached after loading, Figures 15 and 16. This is of considerable importance because the day's loading requirements often cannot be anticipated in time to order pre-iced cars.

During February and March, warm loads in both fan and non-fan cars, re-iced in the Carolinas and vents kept closed to destination, cooled at about the same rate as those converted to standard ventilation in the Carolinas after re-icing, (Fig. 17).

From March through May, full bunker and stage icing standard refrigeration gave essentially the same temperatures in fan cars, (Fig. 18). However, the former gave somewhat lower temperatures in non-fan cars.

Initial icing and one re-icing (Fig. 19) gave no better temperatures in January and February, than ventilation service without ice. As late in the season as March and April ventilated box cars had as good temperatures as refrigerator cars initially iced and re-iced once--the second day after loading. (Fig. 20) The bottom layer of the load had the lowest temperatures in the ventilated box cars, and the middle layer the warmest temperatures with the top layers intermediate. (Fig. 21)

Fruit in small bags. Non-precooled loads of 5-pound open-mesh bags in double deck cars initially iced followed by one re-icing (in the Carolinas the second day after loading) did not cool as rapidly as did similar loads of fruit ventilated beyond the Carolinas during January and February or during March and April, (Figs. 22 and 23).

During February and April, initial icing with vents closed to destination, was compared with one re-icing in the Carolinas. (Fig. 24) Both groups of cars cooled at the same rate until the second day; thereafter the re-iced cars cooled more rapidly.

During the hot weather of May and June, standard refrigeration cooled the lading more effectively than only one re-icing. (Fig. 25)

Closing the vents in "dry" cars loaded with oranges in mesh bags resulted in a rise of temperature until the vents were opened about the second midnight after loading. (Fig. 10, Skinner Gas cars, vents closed to Savannah, Ga.) Thereafter, commodity temperature reduction was rapid and the temperatures in these cars were similar to cars initially iced after loading, re-iced the second day, and vents closed to destination.

The initial ice supply in the bunkers of cars loaded with warm fruit (75° to 80° F.) is fairly well depleted by evening of the day after loading. Under these conditions and favorable outdoor temperatures, cooling is likely to be more rapid if the vents are open after the ice is gone than if vents are closed. This is especially worthy of consideration in the case of warm loads moving under Item 80, Section 1, i.e., 6000 to 8000 pounds of ice supplied at the first icing station reached enroute, or in pre-iced cars of warm fruit.

Whenever the outside air temperature is well below that of the commodity, faster cooling may be expected in cars under ventilation than in those with a small supply of ice. It is seen from Figure 1 that the mean minimum temperature is below 50° F. at Savannah from November to March and that the average 30° minimum isotherm (JAN) cuts across Virginia and Tennessee. Therefore, during the winter months cars loaded with warm oranges or grapefruit and initially iced only, could be advantageously converted to combination ventilation service, Rule 385, Part 3, at Savannah, Albany, Macon or wherever the car may be in south or central Georgia at evening of the day after loading, or the second day out. This should be followed by standard ventilation service part 1 beyond the region in which part 3 is applicable. During cool weather ventilation service from shipping point to destination may be feasible, especially with grapefruit.

PACKAGES AND CAR TYPE IN RELATION TO TEMPERATURE REDUCTION

Spring shipments of crated fruit in ventilated box cars cooled at least as rapidly as that in refrigerator cars given initial icing and one re-icing. Oranges in 5-pound open-mesh bags cooled somewhat more rapidly than those in windowed paper bags loaded in double deck cars; there was no significant difference in rate of cooling between nailed and wirebound crates, open-mesh bags over 1 or 2 layers of crates in standard cars, and open-mesh bags in double deck cars. Fan cars cooled the load faster than non-fan cars whether loaded with fruit in crates or mesh bags.

ICE REMAINING AT UNLOADING

The ice remaining in the bunkers on arrival at destination is likely to serve no useful purpose if the car is unloaded soon after arrival. Yet it is desirable to have some ice in the bunkers in hot weather to prevent a serious rise in commodity temperature should unloading be delayed several days, such as over week-ends. A slight rise in commodity temperature for a day or two is not likely to be harmful even in hot weather.

Room precooled fruit. There was no significant difference between the amount of ice remaining in the bunkers of non-fan cars and that in fan cars at unloading. The greatest average amounts, 7300 and 7600 pounds, were in the non-fan and fan cars, respectively, given full bunker standard refrigeration, while the least amounts, 2400 pounds and 3000 pounds, respectively, were in the stage iced cars re-iced only once. It is noteworthy that this small amount of ice in the upper half of the bunker was sufficient to prevent a rise of commodity temperature, while a larger amount, 4600 pounds, in the bottom of the bunker of initially iced non-fan cars did not prevent a slight rise in commodity temperatures during the third and fourth day after loading in warm weather, (Figs. 3 and 4). In no case was the commodity temperature in the top of the load above 50° F. at unloading.

Precooled in car. During late spring crated oranges in fan cars precooled with ice and given standard refrigeration had 7600 pounds of ice remaining at destination, (Fig. 6). Oranges in open-mesh bags in double deck non-fan cars, precooled with a mechanical unit and re-iced once during transit had 2200 pounds of ice in the bunkers at unloading, (Fig. 9). During the winter months, the cars that were given only initial icing had about 700 pounds of ice left in the bunkers at unloading, (Fig. 10).

Non-precooled loads. In late fall and winter shipments of crated fruit the average amount of ice remaining at destination ranged from 6300 pounds in non-fan cars to 6500 pounds in fan cars given standard refrigeration, and correspondingly, from 3900 to 4600 pounds in those given one re-icing, (Fig. 11). In May and June the average amount of ice remaining at unloading of cars shipped under standard refrigeration ranged from 5600 pounds to 6200 pounds in non-fan and fan cars, respectively, while the range was from 2800 to 3000 pounds in similar cars re-iced but once, (Fig. 14).

The lesser amount of ice in each pairing was found in the non-fan cars. In a few cars loaded with unusually warm fruit and re-iced but once, practically all of the ice was melted when the cars were unloaded.

DECAY AND RIND BREAKDOWN

The amount of decay and rind breakdown depend to a large extent on the condition of the fruit when packed and the temperatures in transit. Since the data from numerous tests with fruit of widely different quality were averaged to prepare the graphs used in this paper only general conclusions can be drawn about the relation of the amount of decay and rind breakdown to the various icing services.

A preliminary examination of the data show a great amount of variability in amount of decay and rind breakdown in the different shipments in all of the temperature ranges. However in general they were worse in shipments that had average transit temperatures above 60, than in those with lower temperatures. This indicates that protective services that provide reasonably fast cooling and average transit temperatures below 60° F. are desirable.

A more detailed analysis is being made of the relation of decay and rind breakdown to transit temperatures and the different protective services. This will be published later.

COMMERCIAL CONSIDERATIONS

The shelf life of fruit is often shortened by delays in refrigeration at shipping point that permit rot organisms to get a good start. This delay may result in decay that is visible on arrival at market or that may remain invisible until after the commodity reaches the retail stores. A knowledge of the time required, under various transit conditions to lower the temperature of the commodity to a safe level is more helpful than a record of commodity temperature at unloading only. For example, 50° pulp temperature quickly attained and maintained is better than a slow reduction to 45°, or even 40° not gained until destination is reached.

Although shipments of oranges and grapefruit can be made safely most of the time without refrigeration to points reached in 2 days, and less frequently to points reached in 3 or 4 days, refrigeration in transit is usually desirable. Except in favorable cool winter weather, ventilation all the way to distant markets provides inadequate cooling and is risky with weak oranges. Tangerines, because of their greater liability to decay, should always be shipped under refrigeration.

Fan cars cool the load faster and more uniformly than do non-fan cars. When the commodity is room-precooled, fan cars are not so necessary.

Room-precooled fruit and warm fruit to be precooled with ice in the car should be loaded in pre-iced cars. Warm fruit precooled with a track-side mechanical unit soon after loading need not be loaded in pre-iced cars, but they should be initially iced as soon as practicable after precooling to retain the benefits of the precooling. In hot weather, room-precooled loads, as well as those precooled with a mechanical unit after loading, may need re-icing 2 or 3 days after loading. Loads precooled with their initial supply of ice should be re-iced the morning after loading if the bunkers cannot be replenished at shipping point.

Precooling loads in non-fan cars is usually desirable in warm weather and especially when decay is prevalent. The need under the same conditions for precooling in fan cars at shipping point has not been demonstrated, but it may be desirable.

When fruit is precooled 5 or 6 hours with bunker ice after loading, it is usually desirable to replenish the bunkers at shipping point and to re-ice the second day after loading if the temperature of the fruit is in the 80's at loading time or if the commodity is "weak." If the commodity temperature is in the mid 60's at loading, re-icing about 24 hours after precooling is satisfactory.

Non-precooled loads under Rule 251 should be re-iced 25 to 40 hours after loading for markets reached within 4 or 5 days.

Rule 240 and Item 80, Section 1, give fairly comparable refrigeration; likewise, Rule 251 and Item 80, Section 2, are comparable. Hence, for brevity, mention is made of only one member of each pair of comparable services.

The suggested protective service schedule is based not only on the results reported herein, but also on those given in AAR Tests 1 and 2, and in H. T. & S. Reports Nos. 263, 277, 279, 280 and 282, issued by this Division. Since both the fruit and weather conditions to be coped with are continually changing, a prearranged schedule that is safe at all times may be unnecessarily expensive during much of the shipping season. For example, during an unusually cold period of late November covered by Report No. 277, and also during the cool period of late December, 1952, ventilation would have cooled the load at least as rapidly as any of the refrigeration services. The prudent use of ventilation can save the industry large sums annually.

The following proposed schedule is designed for average fruit packed in crates or open-mesh bags.

ACKNOWLEDGMENTS

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The United States Weather Bureau, through Mr. Warren O. Johnson, Lakeland, Florida, supplied the climatological data contained in this report.

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SUGGESTED SCHEDULE OF PROTECTIVE SERVICES

A. Non-precooled Shipments

1. Start of Season to Dec. 15 - oranges and grapefruit

a. Shipments to East or Midwest

2 day delivery:	Combination ventliation from shipping point; or Ventilated Box Car
3 to 4 day delivery:	Initial Icing, re-ice 1 or 2 days after loading; in cold Weather, Standard Ventilation beyond Potomac Yard or Cincinnati "Advance Schedule" shipments: Initial Icing, re-ice at Potomac Yards. In cold weather, Initial Icing, Standard Ventilation beyond Potomac Yard.
5 to 7 day delivery:	Early Fall: Stage Icing, Standard Refrigeration
5 to 7 day delivery:	Late Fall: Initial Icing, re-ice 1 or 2 days after loading; in cold weather, convert to Standard Ventilation beginning 3rd or 4th night.

b. Transcontinental Shipments:

Stage Icing, Standard Refrigeration

2. Winter - Oranges

a. Shipments to East or Midwest

2 day delivery:	Combination Ventilation from shipping point: or Ventilated Box Car
3 to 4 day delivery:	Initial Icing, Combination Ventilation from Waycross or Savannah; or Initial Icing, re-ice 2 days after loading, PIVC destination or Standard Ventilation beginning 3rd night. "Advance Schedule" shipments, Initial Icing, Standard Ventilation beyond Potomac Yard; or Initial Icing, re-ice 2 days after loading.
5 to 7 day delivery:	Initial Icing, re-ice 2 days after loading, Standard Ventilation beginning 3rd night. "Advance Schedule" shipments, Initial Icing, Standard Ventilation beyond Potomac Yard.

b. Transcontinental Shipments:

Initial Icing, re-ice 2 days after loading, Standard Ventilation beginning 4th or 5th night; or

Stage Icing, Standard Refrigeration; or

Initial Icing, Combination Ventilation beginning 2 days after loading.

3. Winter - Grapefruit
   a. Shipments to East or Midwest:
      - 2 day delivery: Ventilated Box Car; or
        Combination Ventilation from shipping point.
      - 3 to 4 day delivery: Combination Ventilation from shipping point; or
        Initial Icing, Combination Ventilation from Waycross or Savannah.
      - 5 to 7 day delivery: Combination Ventilation from shipping point; or
        Initial Icing, Combination Ventilation from Waycross or Savannah.

   b. Transcontinental Shipments:
      Initial Icing, re-ice 2 days after loading, Standard Ventilation beginning 4th or 5th night; or
      Stage Icing, Standard Refrigeration.
      Initial Icing, Combination Ventilation beginning 2 days after loading.

4. March and April - Oranges and Grapefruit
   a. Shipments to East or Midwest:
      - 2 day delivery: Ventilated Box Car; or
        Combination Ventilation from shipping point; or
        Initial Icing.
      - 3 to 4 day delivery: Initial Icing, Combination Ventilation beginning at Waycross or Savannah; or
        Initial Icing, re-ice 2nd day after loading.
        "Advance Schedule" shipments in cool weather: Initial Icing, Standard Ventilation beyond Potomac Yard.
      - 5 to 7 day delivery: Initial Icing, re-ice 1 or 2 days after loading, Standard Ventilation beginning 3rd or 4th night; or
        Initial Icing, Standard Ventilation beyond Potomac Yard.
        "Advanced Schedule" shipments in cool weather: Initial Icing, Standard Ventilation beyond Potomac Yard.

   b. Transcontinental Shipments:
      Initial Icing, re-ice 2 days after loading, Standard Ventilation beginning 4th or 5th night: or
      Stage Icing, Standard Refrigeration

5. May and June - Oranges and Grapefruit
   a. Shipments to East or Midwest
      - 2 day delivery: Initial Icing
      - 3 to 4 day delivery: Initial Icing, re-ice 2 days after loading; or
        Stage Icing, Standard Refrigeration.
      - 5 to 7 day delivery: Stage Icing, Standard Refrigeration.

   b. Transcontinental Shipments:
      Stage Icing, Standard Refrigeration

B. Precooled Oranges and Grapefruit
  1. Shipments to East or Midwest - 4 to 5 day delivery
    a. Fall
      Room precooled: Initial Icing
      Precooled in car with mechanical refrigeration: Initial Icing, Standard Ventilation beginning 3rd night after loading, or at Potomac Yard with "Advanced Schedule" shipments; or
      Stage Icing, re-iced 2nd day.
      Precooled in car with car fans and bunker ice:
        Early Fall: Pre-iced, re-ice 24 to 30 hours after loading
        Late Fall: Pre-iced, replenish bunkers at shipping point if practicable, Combination Ventilation from Waycross or Savannah.
    b. Winter and Early Spring
      Room precooled: Initial Icing; or Stage Icing, re-ice 2nd day
      Precooled in car with mechanical refrigeration: Initial Icing, Standard Ventilation beginning 3rd night after loading, or at Potomac Yard with "Advance Schedule" shipments; or
      Stage Icing, re-iced 2nd day
      Precooled in car with car fans and bunker ice:
        Winter: Pre-iced, replenish bunkers at shipping point if practicable, Combination Ventilation from Waycross or Savannah; or
        Standard Ventilation at Potomac Yard with "Advance Schedule" shipments.
        Spring: Pre-iced, re-iced 1 or 2 days after loading
    c. Late Spring or Summer
      Room precooled: Initial Icing re-ice 2nd day; or
      Stage Icing, Standard Refrigeration
      Precooled in car with mechanical refrigeration: Initial Icing, re-ice 2 days after loading; or
      Stage Icing, Standard Refrigeration
      Precooled in car with car fans and bunker ice: Pre-iced, re-ice 1 or 2 days after loading; or
      Pre-iced, replenish bunkers at shipping point if practicable, and re-ice 2nd or 3rd day; otherwise re-ice 24 to 30 hours after loading.

  2. Transcontinental Shipments
    a. Winter
      Room precooled: Initial Icing, re-ice 3rd or 4th day
      Precooled in car with mechanical refrigeration: Initial Icing, re-ice 3 or 4 days after loading.
      Precooled in car with car fans and bunker ice: Pre-iced, replenish bunkers at shipping point and re-ice 3rd or 4th day after loading.
    b. Warm Weather
      Room precooled: Stage Icing, Standard Refrigeration
      Precooled in car with mechanical refrigeration: Stage Icing, Standard Refrigeration
      Precooled in car with car fans and bunker ice: Stage Icing, Standard Refrigeration, replenish bunkers at shipping point.

Explanation of Services -

Standard Ventilation - (Rule 385, part 1.) Close vents at 32°, open above 32°

Combination Ventilation - (Rule 385, part 3, sec. 10) Close vents at 25°, open above 25°, to specified station south of northern boundaries of North Carolina and Tennessee and east of Mississippi River; standard ventilation beyond.

Standard Refrigeration - Rule 201 Initial icing and re-ice to capacity at all regular icing stages.

Initial Icing - (Rule 240) Initial ice only, either before (pre-iced) or after loading.

Initial Icing plus 1 re-icing - (Rule 251) Car iced either before or after loading plus one re-icing at point designated by shipper.

Half Stage Icing - (Rule 255) Raising bunker ice grates to half-way position providing about 50% capacity of full bunker. Used with any icing service provided at 78 percent of full bunker charge.

PIVC - Rule 385, part 2 - Special ventilation - plugs in, vents closed to designated station.

Figure 1

AVERAGE MONTHLY TEMPERATURES
(WINTER SEASON)
ALONG PRINCIPAL SHIPPING ROUTES

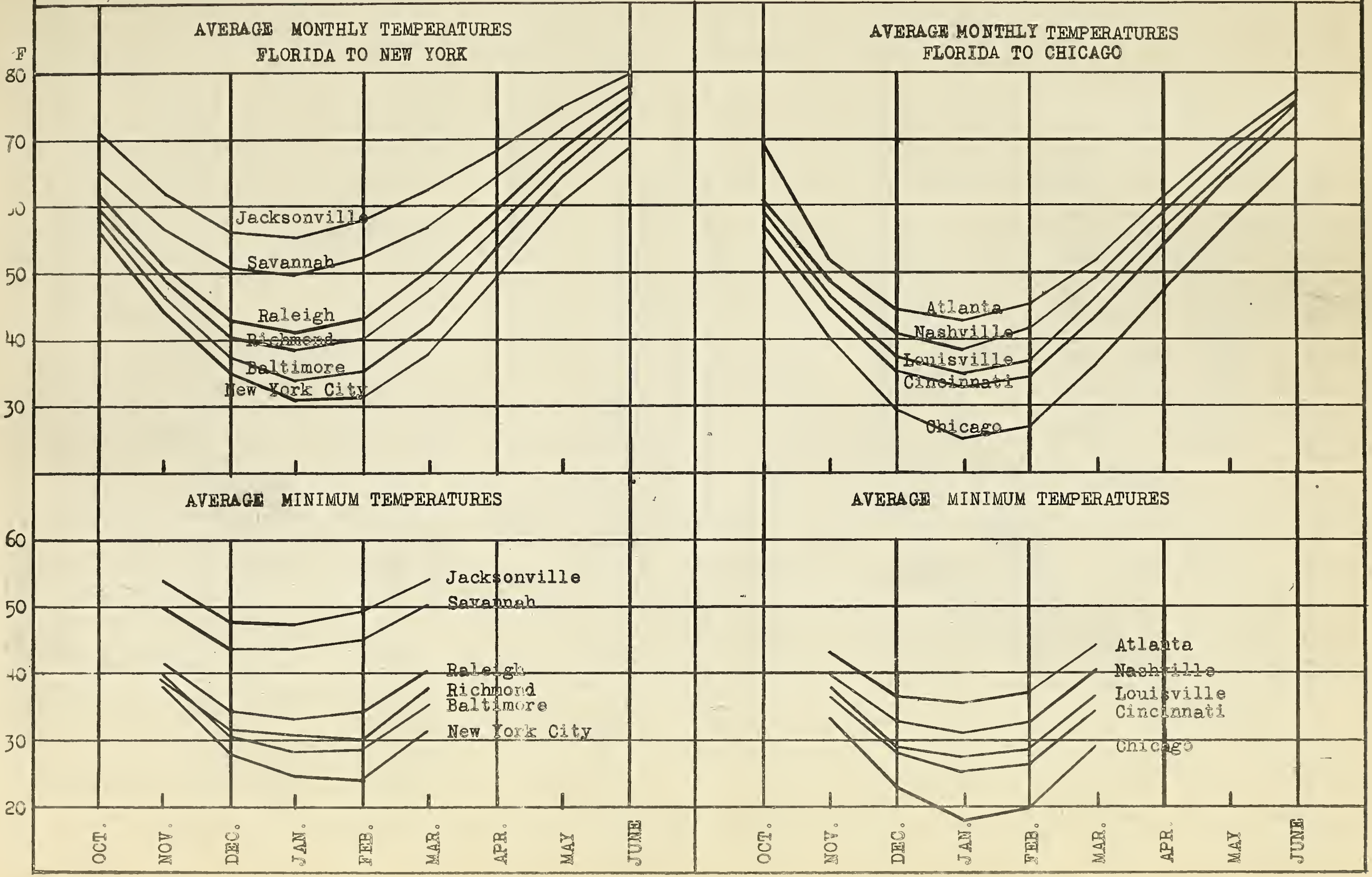
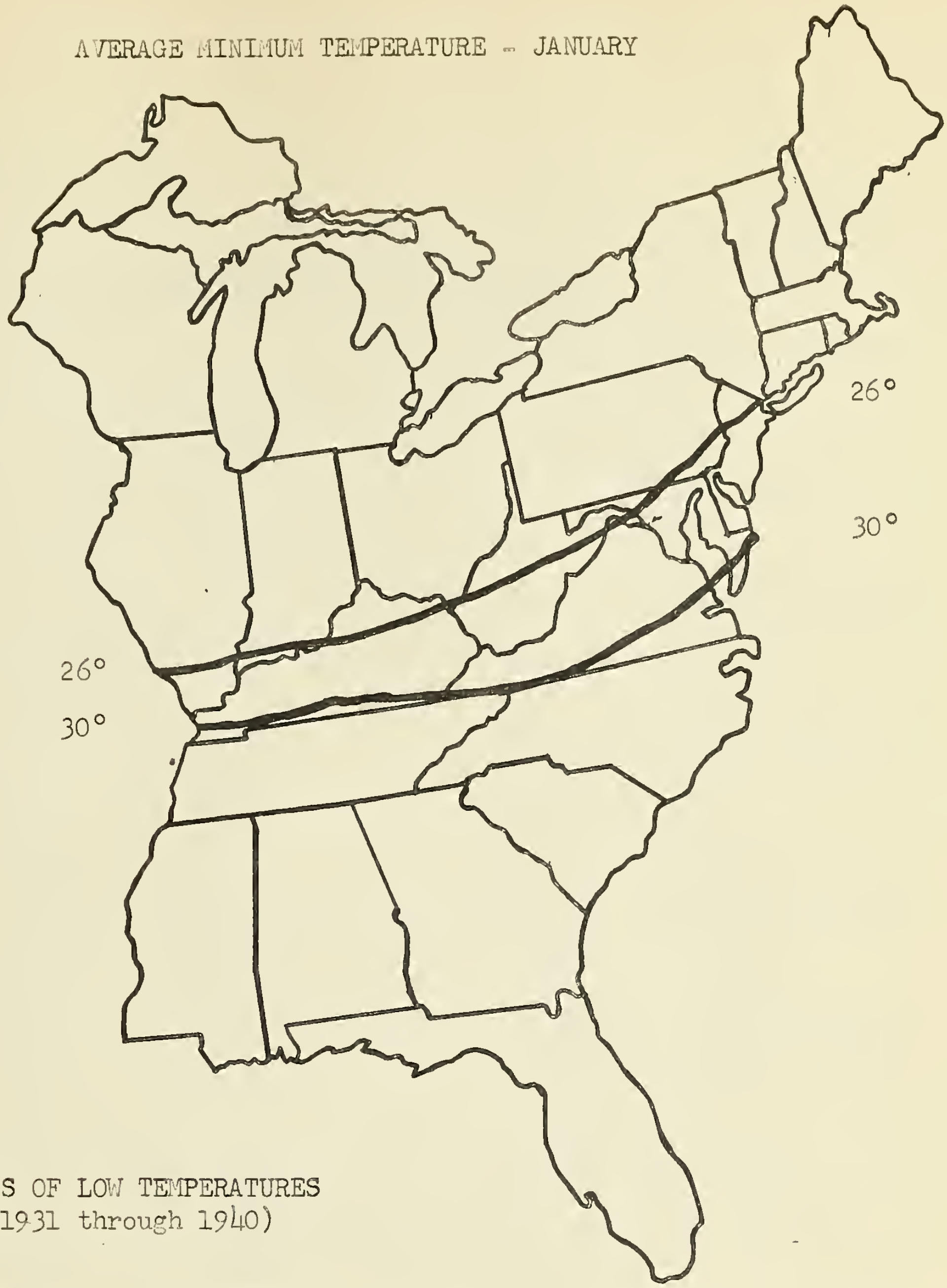


Figure 2

AVERAGE MINIMUM TEMPERATURE - JANUARY



FREQUENCIES OF LOW TEMPERATURES
(From 1931 through 1940)

STATION	NUMBER OF DAYS	NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
		20° or less	25° or less	20° or less	25° or less	20° or less	25° or less	20° or less	25° or less	20° or less	25° or less
Richmond, Va.	Range Average	0-2 0.5	0-6 2.1	0-12 3.2	2-16 6.5	0-19 4.8	0-26 8.2	0-15 4.4	2-20 8.4	0-3 0.8	0-8 2.5
Lynchburg, Va.	Range Average	0-2 1.0	0-5 2.8	0-13 3.1	2-16 6.4	0-15 4.9	0-24 8.1	0-13 4.2	1-19 7.3	0-4 1.1	0-8 2.6
Knoxville, Tenn.	Range Average	0-3 0.6	0-6 1.9	0-9 2.2	0-16 4.9	0-15 3.7	0-19 6.1	0-8 2.7	0-9 4.6	0-5 0.7	0-10 1.8
Nashville, Tenn.	Range Average	0-3 0.8	0-6 2.2	0-9 2.7	0-15 5.4	0-17 4.8	0-23 6.8	0-10 3.2	0-16 5.8	0-6 0.7	0-10 1.8
Memphis, Tenn.	Range Average	0-2 0.4	0-3 0.9	0-6 1.7	0-8 3.3	0-17 3.7	0-21 5.5	0-8 1.7	0-16 3.6	0-3 0.4	0-6 0.8

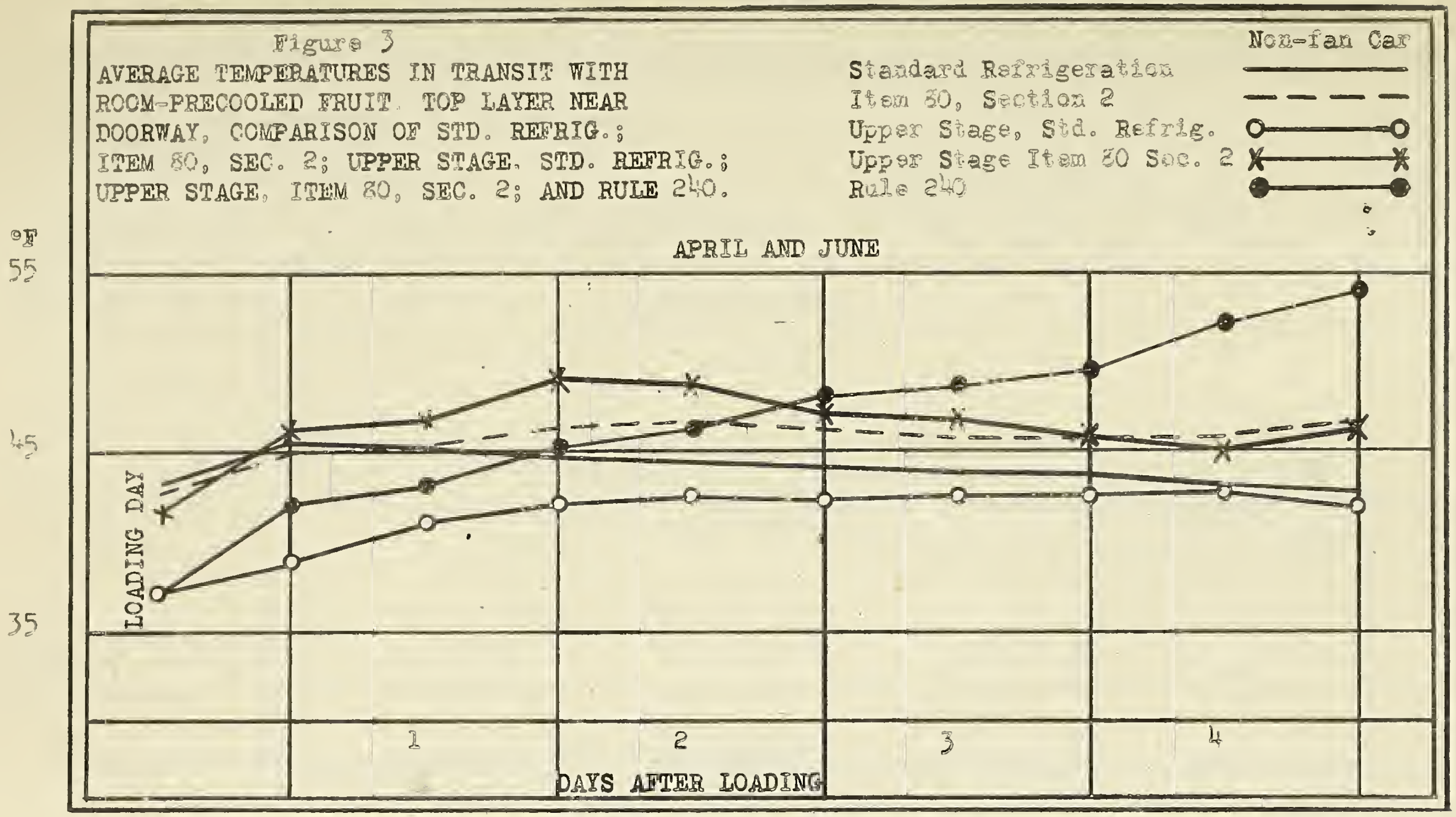


Figure 3
AVERAGE TEMPERATURES IN TRANSIT WITH ROOM-PRECOOLED FRUIT. TOP LAYER NEAR DOORWAY, COMPARISON OF STD. REFRIG.; ITEM 80, SEC. 2; UPPER STAGE, STD. REFRIG.; UPPER STAGE, ITEM 80, SEC. 2; AND RULE 240.

	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 Week RB %	Plus 1 Week DK %
Non-fan Cars								
Standard Refrigeration	13	50081	20246	7300	5.9	0.8	12.3	17.6
Item 80, Section 2	13	50641	15908	4800	2.7	1.4	6.1	11.5
Upper Stage, Standard Refrig.	5	49049	14717	4100	3.4	0.2	6.5	17.6
Upper Stage, Item 80, Section 2	6	49107	9650	2400	0.0	0.6	1.9	3.1
Rule 240	6	48515	9867	4600	7.7	0.0	17.7	4.3

*RB signifies Rind Breakdown; DK, decay.

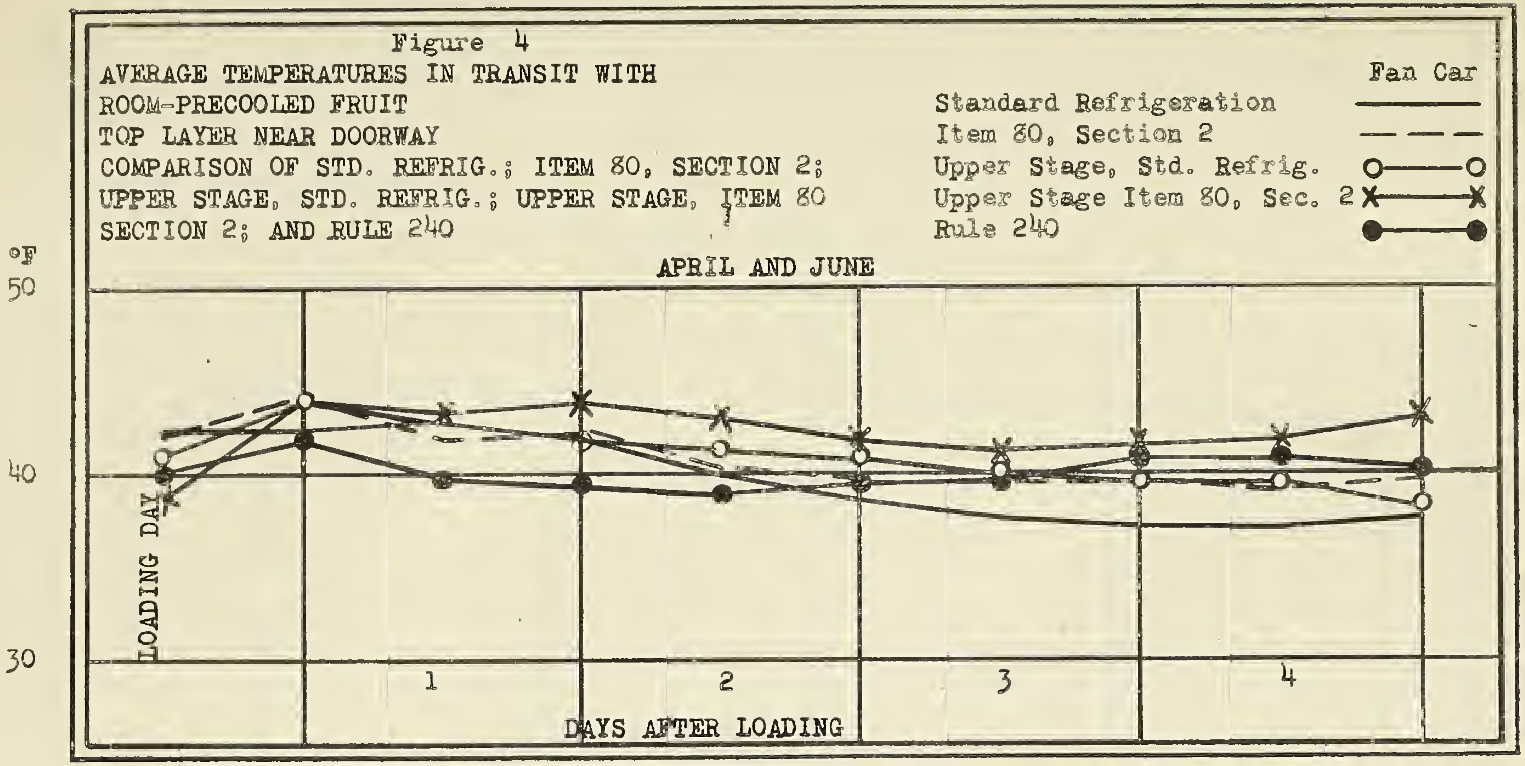
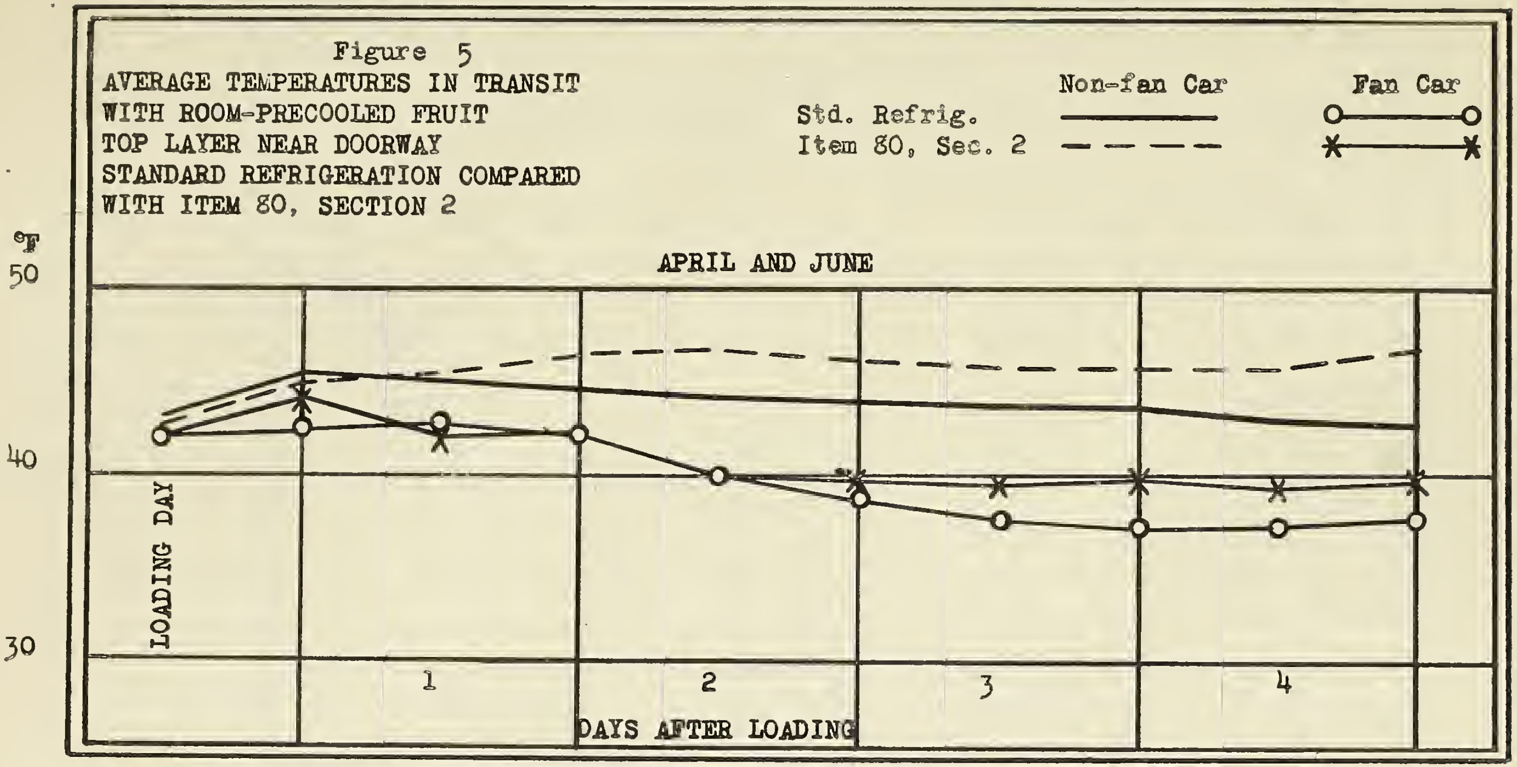


Figure 4
AVERAGE TEMPERATURES IN TRANSIT WITH
ROOM-PRECOOLED FRUIT
TOP LAYER NEAR DOORWAY
COMPARISON OF STD. REFRIG.; ITEM 80, SECTION 2;
UPPER STAGE, STD. REFRIG.; UPPER STAGE, ITEM 80
SECTION 2; AND RULE 240

	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 week RB %	Plus 1 week DK %
Fan Cars								
Standard Refrigeration	6	50685	19086	7600	0.2	0.0	0.7	4.7
Item 80, Section 2	9	51611	14944	5800	3.9	0.2	8.1	3.0
Upper Stage, Standard Refrigeration	4	49434	12800	3300	0.0	0.0	2.5	6.3
Upper Stage, Item 80, Section 2	3	51531	9600	3000	2.1	0.6	4.0	10.5
Rule 240	3	48825	10367	4800	8.4	0.0	23.8	5.1

*RB signifies Rind Breakdown; DK, decay.

Figure 5
AVERAGE TEMPERATURES IN TRANSIT
WITH ROOM-PRECOOLED FRUIT
TOP LAYER NEAR DOORWAY
STANDARD REFRIGERATION COMPARED
WITH ITEM 80, SECTION 2



	Number of Tests	Billed Wts.	Ice Supplied	Ice Remaining	Fruit Inspection at Unloading		Plus 1 Week	
		Lbs.	Lbs.	Lbs.	RB*	DK*	RB	DK
					%	%	%	%
Non-fan Cars								
Item 80, Section 2	13	50641	15908	4800	2.7	1.4	6.1	11.5
Standard Refrigeration	13	50081	20246	7300	5.9	0.8	12.3	17.6
Fan Cars								
Item 80, Section 2	9	51611	14944	5800	3.9	0.2	8.1	3.0
Standard Refrigeration	6	50685	19086	7600	0.2	0.0	0.7	4.7

*RB signifies Rind Breakdown; DK, decay.

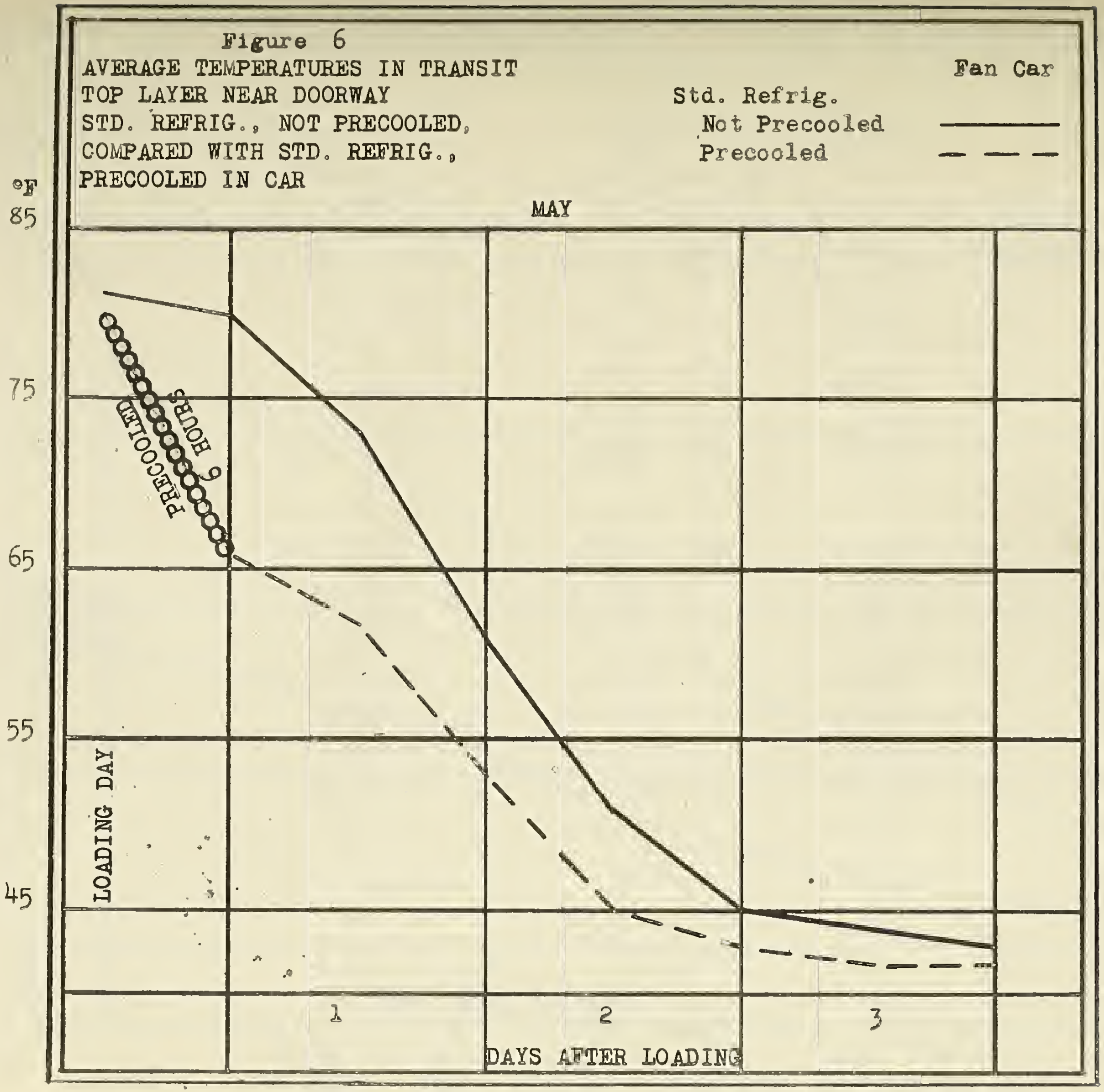


Figure 6
AVERAGE TEMPERATURES IN TRANSIT
TOP LAYER NEAR DOORWAY
STD. REFRIG., NOT PRECOOLED,
COMPARED WITH STD. REFRIG.,
PRECOOLED IN CAR

	Number of Tests	Billed Wts.	Ice Supplied	Ice Remaining	Fruit Inspection at Unloading		Plus 1 Week	
		Lbs.	Lbs.	Lbs.	RB*	DK*	RB	DK
Fan Cars								
Standard Refrigeration					%	%	%	%
Not Precooled	3	52600	26275	6300	0.0	0.1	1.4	5.8
Precooled	3	52933	26033	7600	0.0	0.7	2.0	4.8

*RB signifies Rind Breakdown; DK, decay.

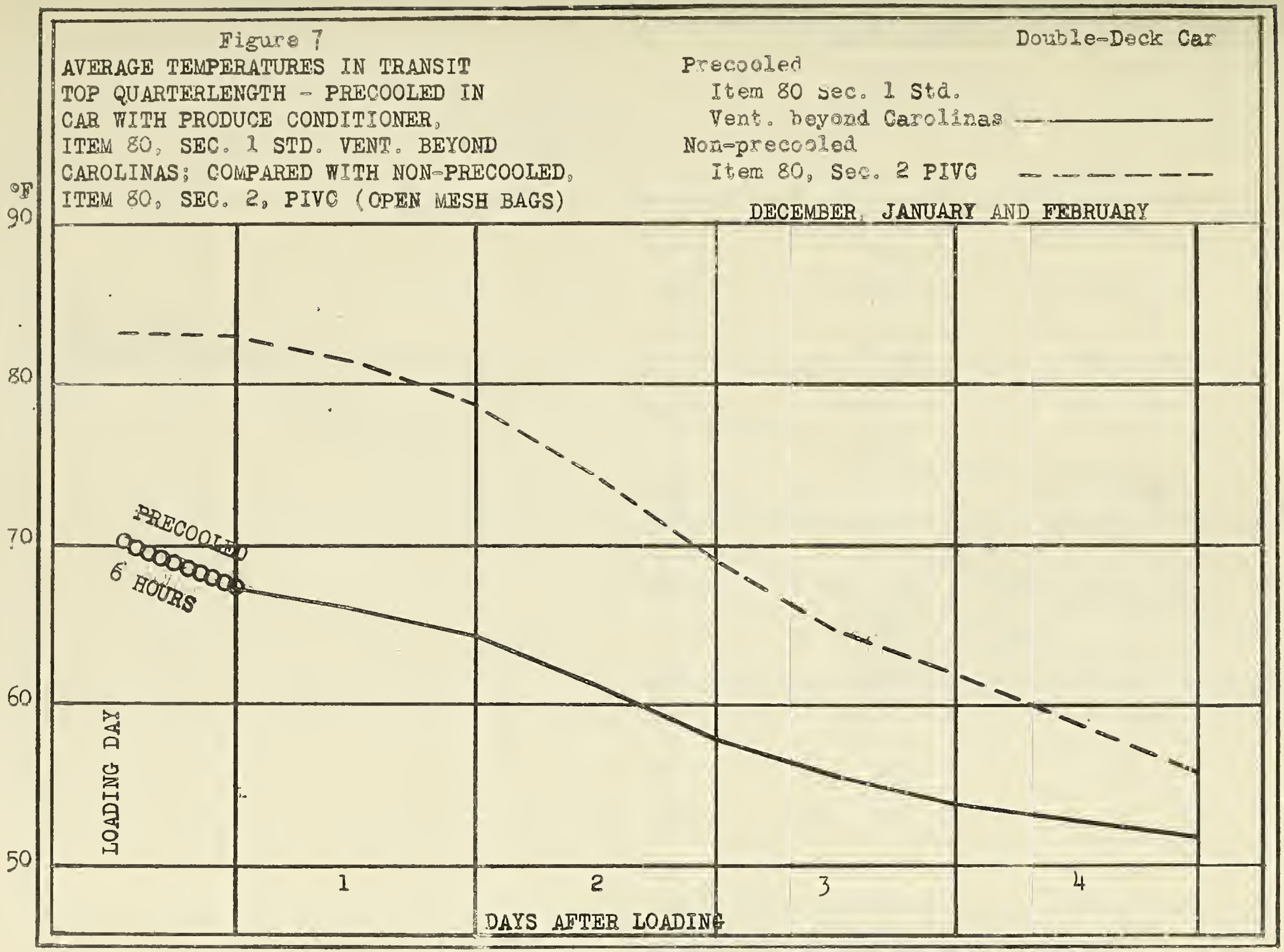


Figure 7

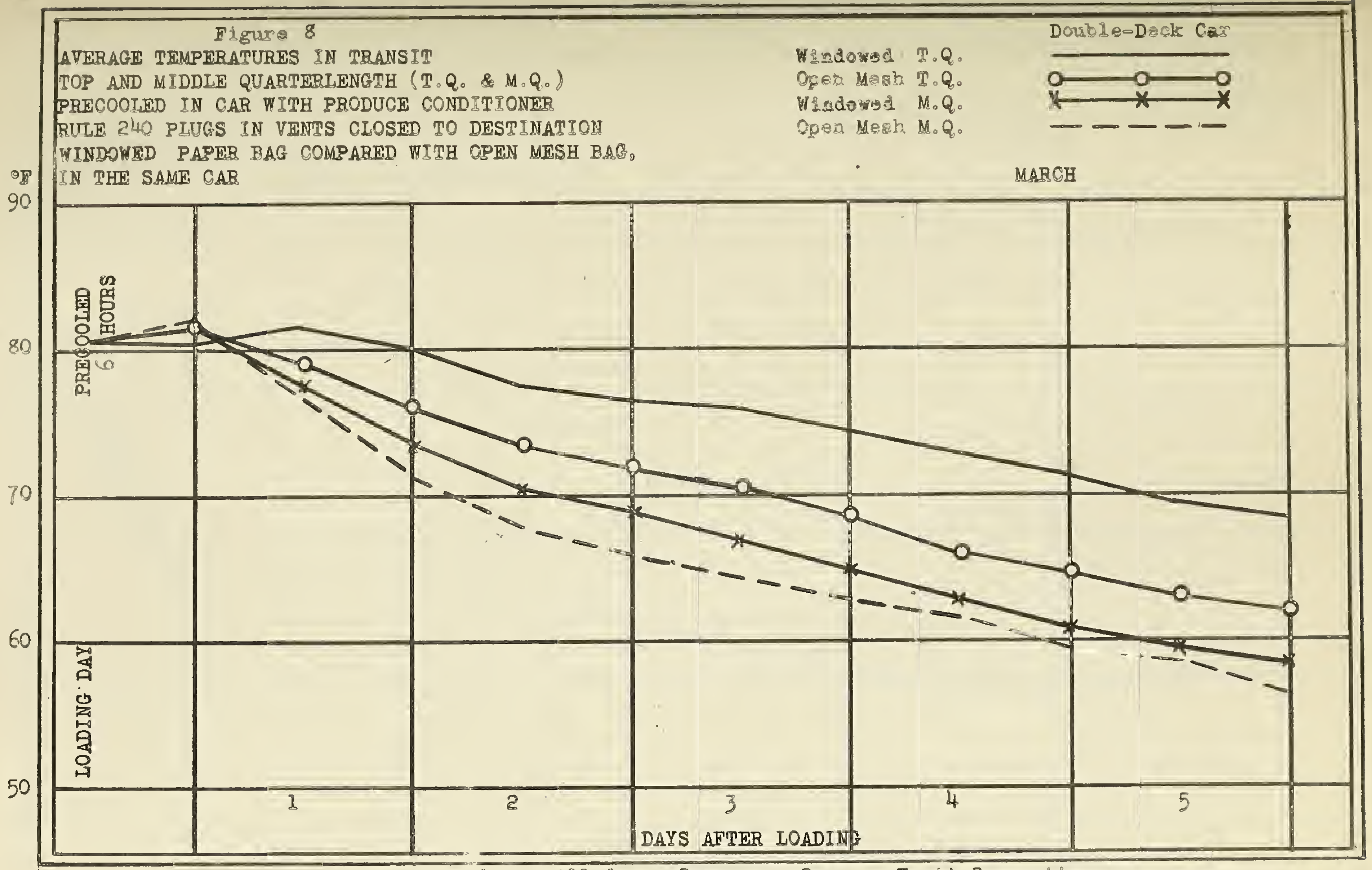
AVERAGE TEMPERATURES IN TRANSIT TOP QUARTERLENGTH - PRECOOLED IN CAR WITH PRODUCE CONDITIONER, ITEM 80, SEC. 1 STD. VENT. BEYOND CAROLINAS; COMPARED WITH NON-PRECOOLED, ITEM 80, SEC. 2, PIVC (OPEN MESH BAGS)

	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 Week RB %	Plus 1 Week DK %
Double-Deck Cars								
Item 80 Sec. 1 Std. Vent. beyond Carolinas	10	40571	7480	1400	8.1	1.4	18.9	10.6
Item 80 Sec. 2, PIVC	10	42621	14280	4100	14.0	2.9	25.5	11.6

*RB signifies Rind Breakdown; DK, decay.

Figure 8

AVERAGE TEMPERATURES IN TRANSIT
TOP AND MIDDLE QUARTERLENGTH (T.Q. & M.Q.)
PRECOOLED IN CAR WITH PRODUCE CONDITIONER
RULE 240 PLUGS IN VENTS CLOSED TO DESTINATION
WINDOWED PAPER BAG COMPARED WITH OPEN MESH BAG,
IN THE SAME CAR



	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 Week RB %	Plus 1 Week DK %
Double-Deck Cars								
Rule 240, PIVC	2	41992	9600	50				
Vent View T.Q.					11.0	4.1	8.2	11.2
Open Mesh T.Q.					3.2	1.3	8.9	12.0
Vent-View M.Q.					5.8	2.1	9.5	8.6
Open Mesh M.Q.					4.8	0.6	16.3	11.4

*RB signifies Rind Breakdown; DK, decay.

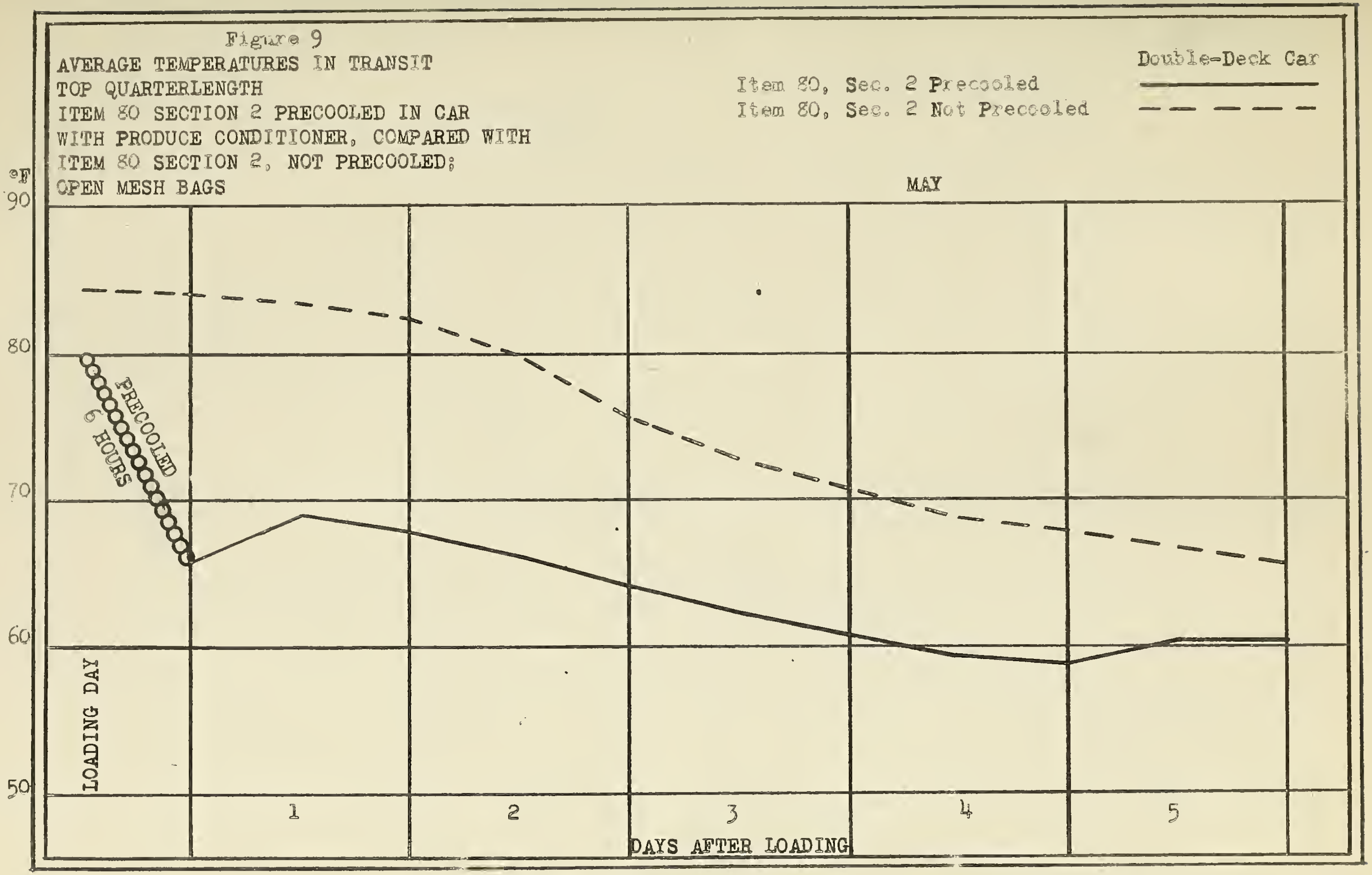


Figure 9

AVERAGE TEMPERATURES IN TRANSIT
TOP QUARTERLENGTH
ITEM 80 SECTION 2 PRECOOLED IN CAR
WITH PRODUCE CONDITIONER, COMPARED WITH
ITEM 80 SECTION 2, NOT PRECOOLED;
OPEN MESH BAGS

	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 Week RB %	Plus 1 Week DK %
Double-Deck Cars								
Item 80, Section 2, Precooled	8	48023	14775	2200	2.7	0.9	3.5	16.6
Item 80, Section 2, Not Precooled	8	48024	17613	1800	3.8	3.8	4.8	26.7

*RB signifies Rind Breakdown; DK, decay.

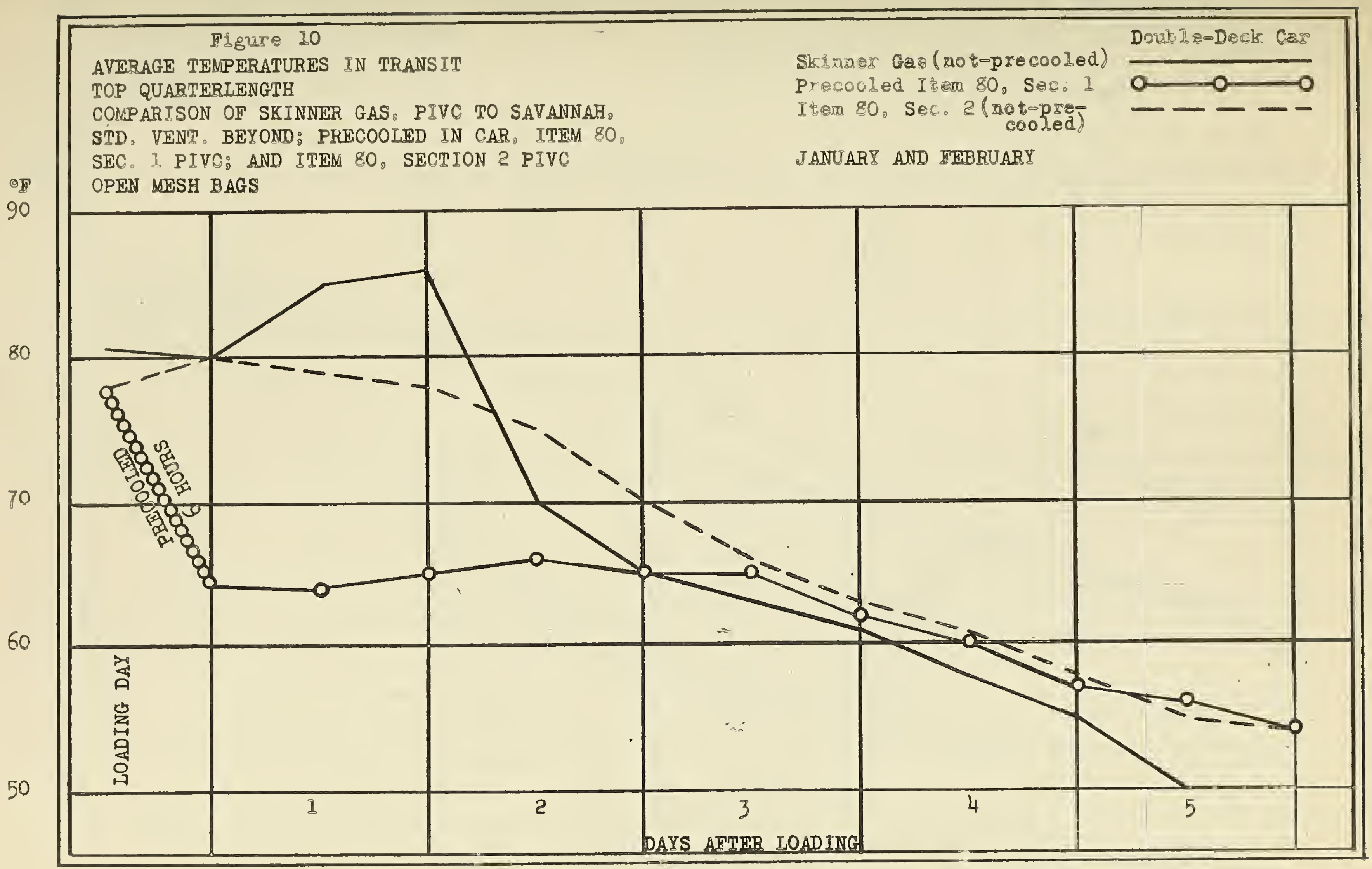


Figure 10

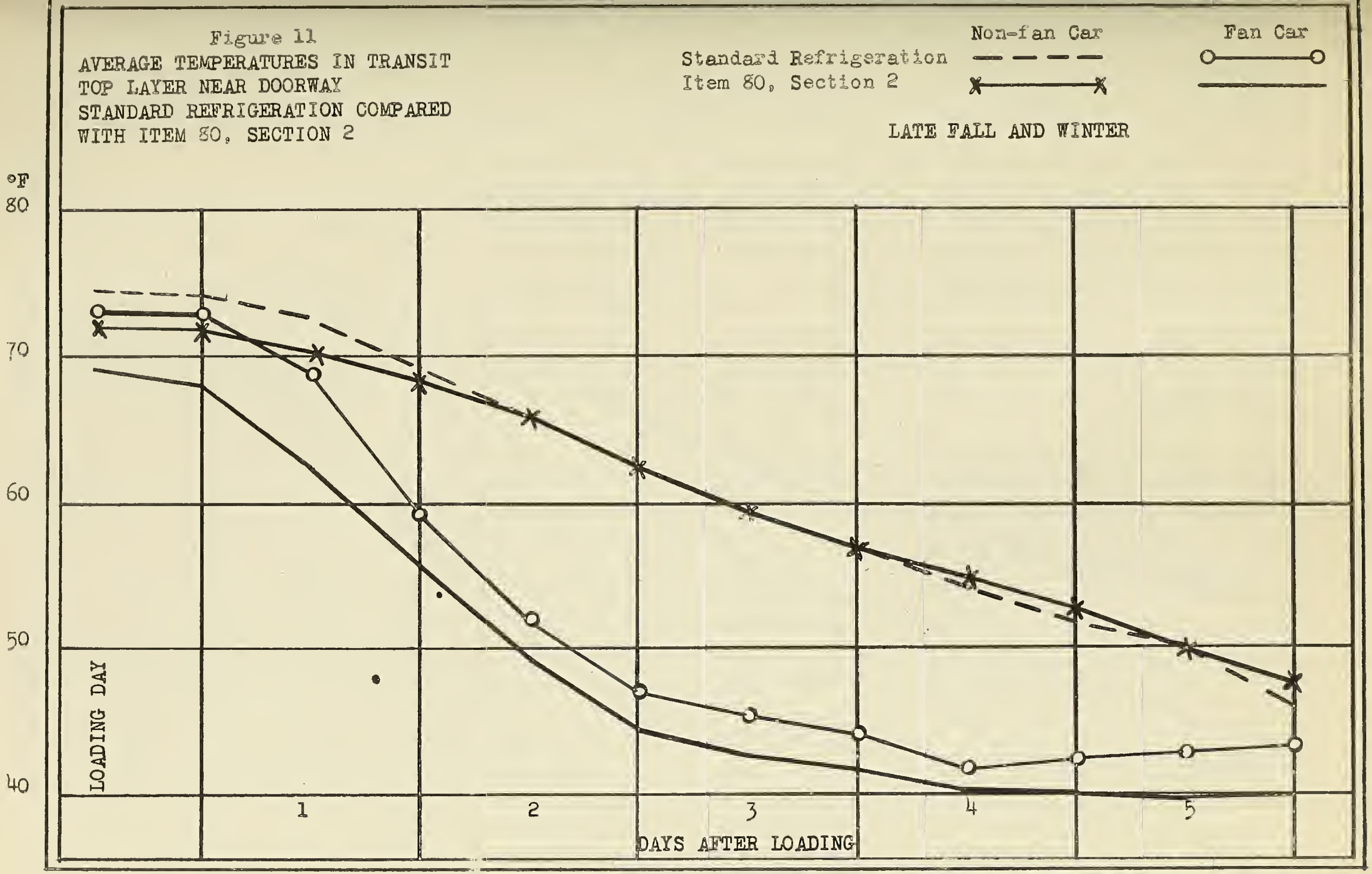
AVERAGE TEMPERATURES IN TRANSIT
TOP QUARTERLENGTH
COMPARISON OF SKINNER GAS, PIVC TO SAVANNAH, STD. VENT. BEYOND; PRECOOLED IN CAR, ITEM 80, SEC. 1 PIVC; AND ITEM 80, SECTION 2 PIVC
OPEN MESH BAGS

JANUARY AND FEBRUARY

	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 Week RB %	Plus 1 Week DK %
Double-Deck Cars								
Skinner Gas	3	40424	None	None	11.1	1.6	23.3	8.6
Precooled Item 80, Sec. 1	3	40424	6000	700	12.4	2.2	22.0	9.8
Item 80, Sec. 2	3	40424	18167	3500	14.9	1.4	27.7	9.5

*RB signifies Rind Breakdown; DK, decay.

Figure 11
AVERAGE TEMPERATURES IN TRANSIT
TOP LAYER NEAR DOORWAY
STANDARD REFRIGERATION COMPARED
WITH ITEM 80, SECTION 2



	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 Week RB %	Plus 1 Week DK %
Non-fan Cars								
Item 80, Sec. 2	37	49574	15916	3900	1.9	1.4	7.6	9.4
Std. Refrig.	19	49978	20415	6300	4.4	2.0	7.4	11.2
Fan Cars								
Item 80, Sec. 2	30	48475	17036	4600	0.6	0.7	4.3	6.0
Std. Refrig.	14	48350	22121	6500	0.1	0.6	0.2	3.9

*RB signifies Rind Breakdown; DK, decay.

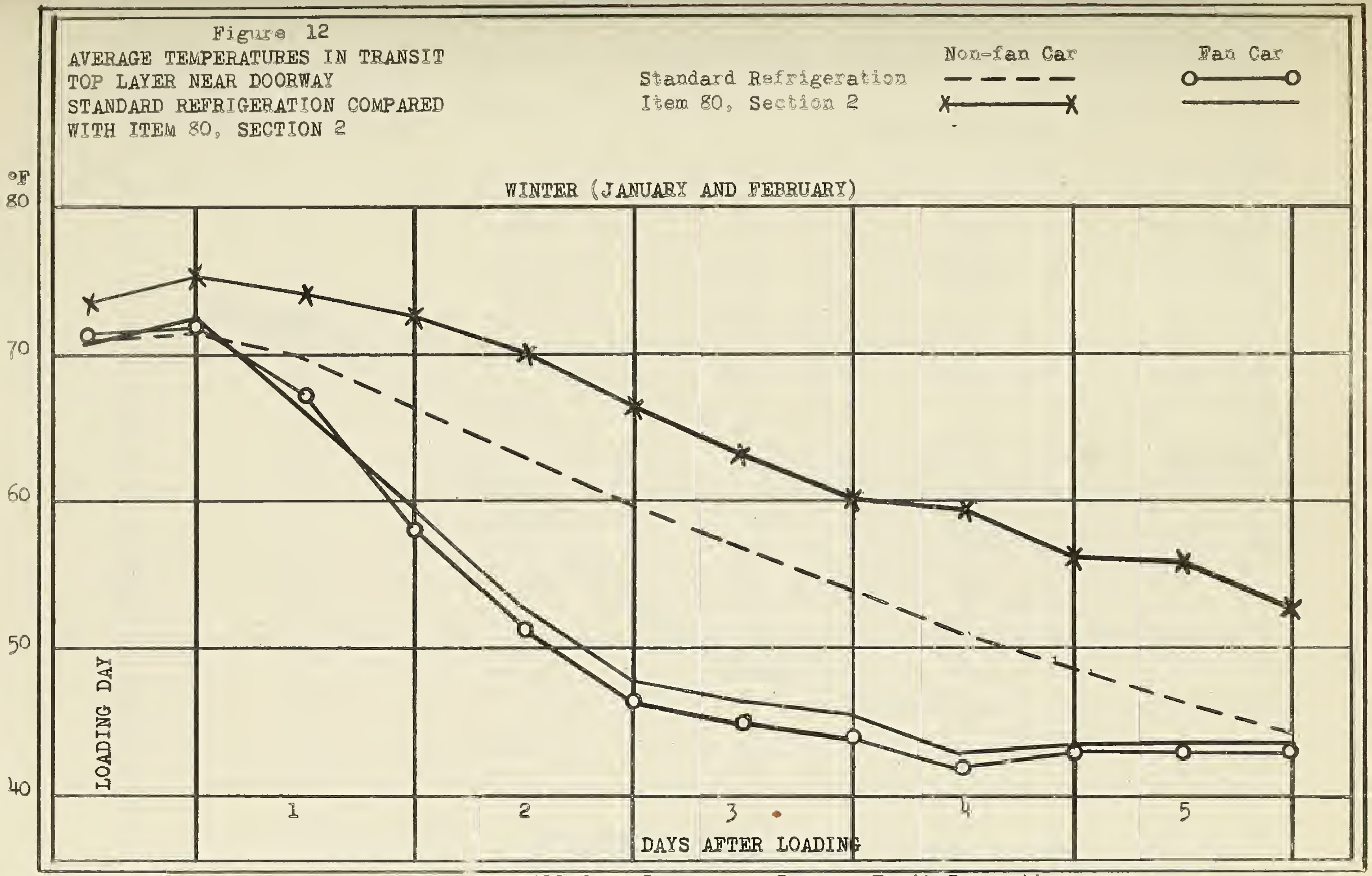


Figure 12
AVERAGE TEMPERATURES IN TRANSIT
TOP LAYER NEAR DOORWAY
STANDARD REFRIGERATION COMPARED
WITH ITEM 80, SECTION 2

	Number of Tests	Billed Wts.	Ice Supplied	Ice Remaining	Fruit Inspection at Unloading		Plus 1 Week	
		Lbs.	Lbs.	Lbs.	RB*	DK*	RB	DK
					%	%	%	%
Non-fan Cars								
Item 80, Section 2	12	48925	17567	3600	4.1	1.8	14.8	11.2
Standard Refrigeration	10	47991	18273	6000	3.8	0.6	8.0	6.8
Fan Cars								
Item 80, Section 2	12	48463	17923	3500	0.0	0.9	1.4	6.3
Standard Refrigeration	11	48292	21909	6500	0.0	0.7	0.3	4.0

*RB signifies Rind Breakdown; DK, decay.

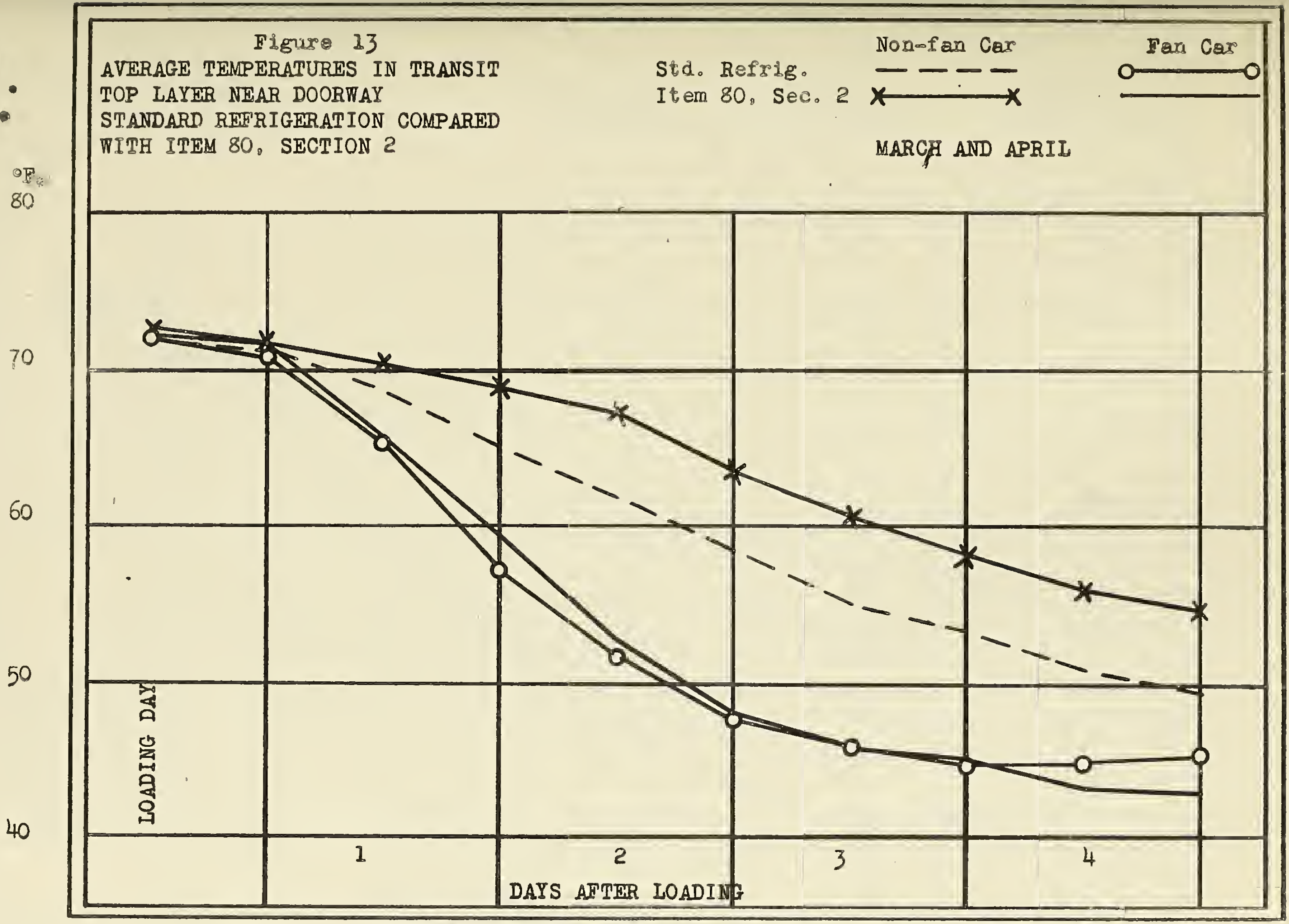


Figure 13
AVERAGE TEMPERATURES IN TRANSIT
TOP LAYER NEAR DOORWAY
STANDARD REFRIGERATION COMPARED
WITH ITEM 80, SECTION 2

	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 Week RB %	Plus 1 Week DK %
Non-fan Cars								
Item 80, Sec. 2	24	49583	17128	3600	1.5	1.5	3.8	9.9
Std. Refrig.	24	48621	20785	6900	1.5	0.8	4.7	5.8
Fan Cars								
Item 80, Sec. 2	17	49437	18022	4700	0.6	0.8	3.3	4.4
Std. Refrig.	16	50197	22194	7100	0.8	0.2	3.7	4.0

*RB signifies Rind Breakdown; DK, decay.

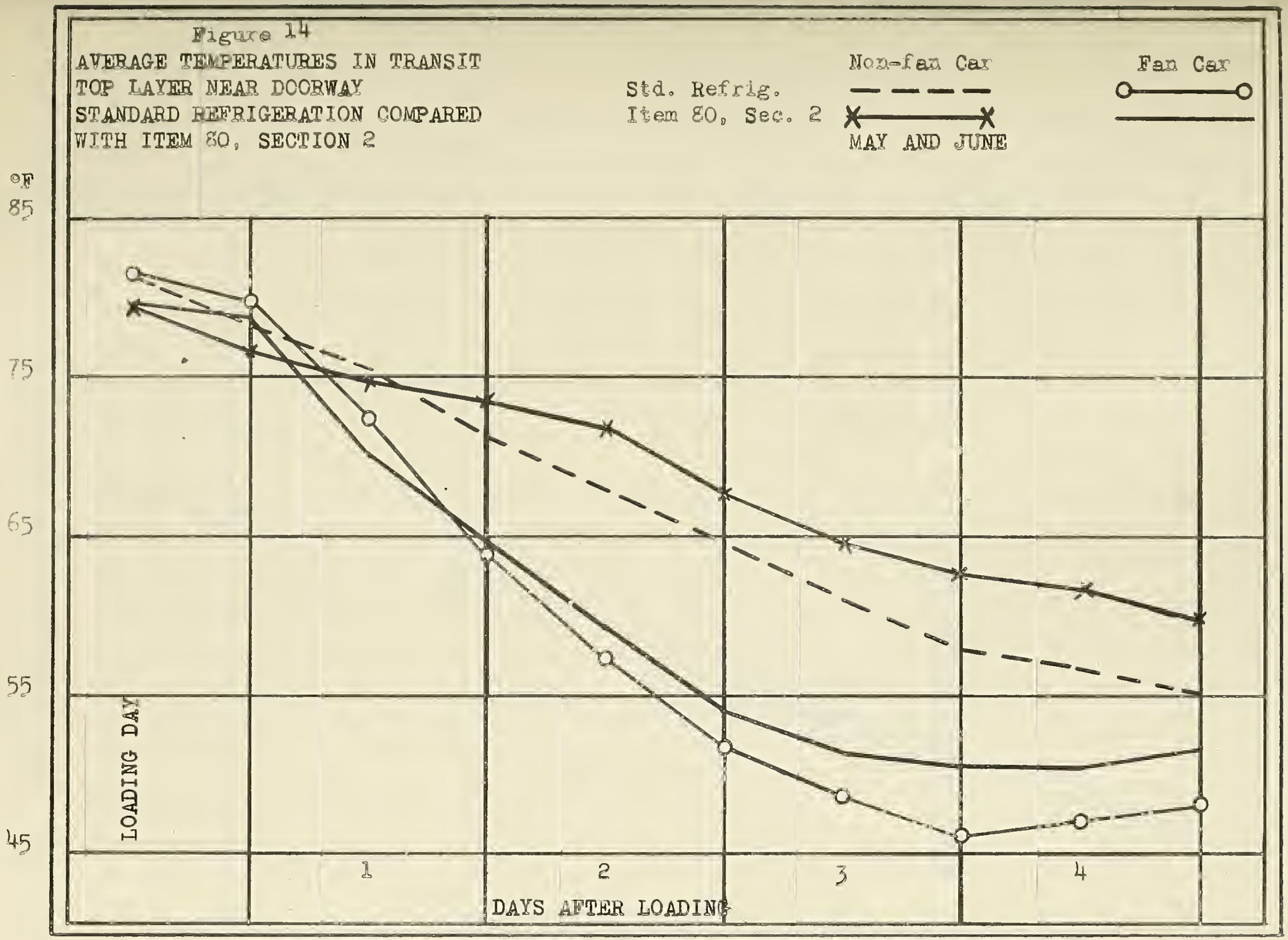


Figure 14

AVERAGE TEMPERATURES IN TRANSIT
TOP LAYER NEAR DOORWAY
STANDARD REFRIGERATION COMPARED
WITH ITEM 80, SECTION 2

	Number of Tests	Billed Wts.	Ice Supplied	Ice Remaining	Fruit Inspection at Unloading		Plus 1 Week	
		Lbs.	Lbs.	Lbs.	RB*	DK*	RB	DK
					%	%	%	%
Non-fan Cars								
Item 80, Sec. 2	19	48838	18411	2800	2.9	0.9	13.5	13.1
Std. Refrig.	14	50053	25144	5600	1.3	0.6	6.4	10.7
Fan Cars								
Item 80, Sec. 2	16	48873	19519	3000	1.2	0.4	4.3	11.2
Std. Refrig.	16	51057	25959	6200	1.1	0.5	3.9	7.0

*RB signifies Rind Breakdown; DK, decay.

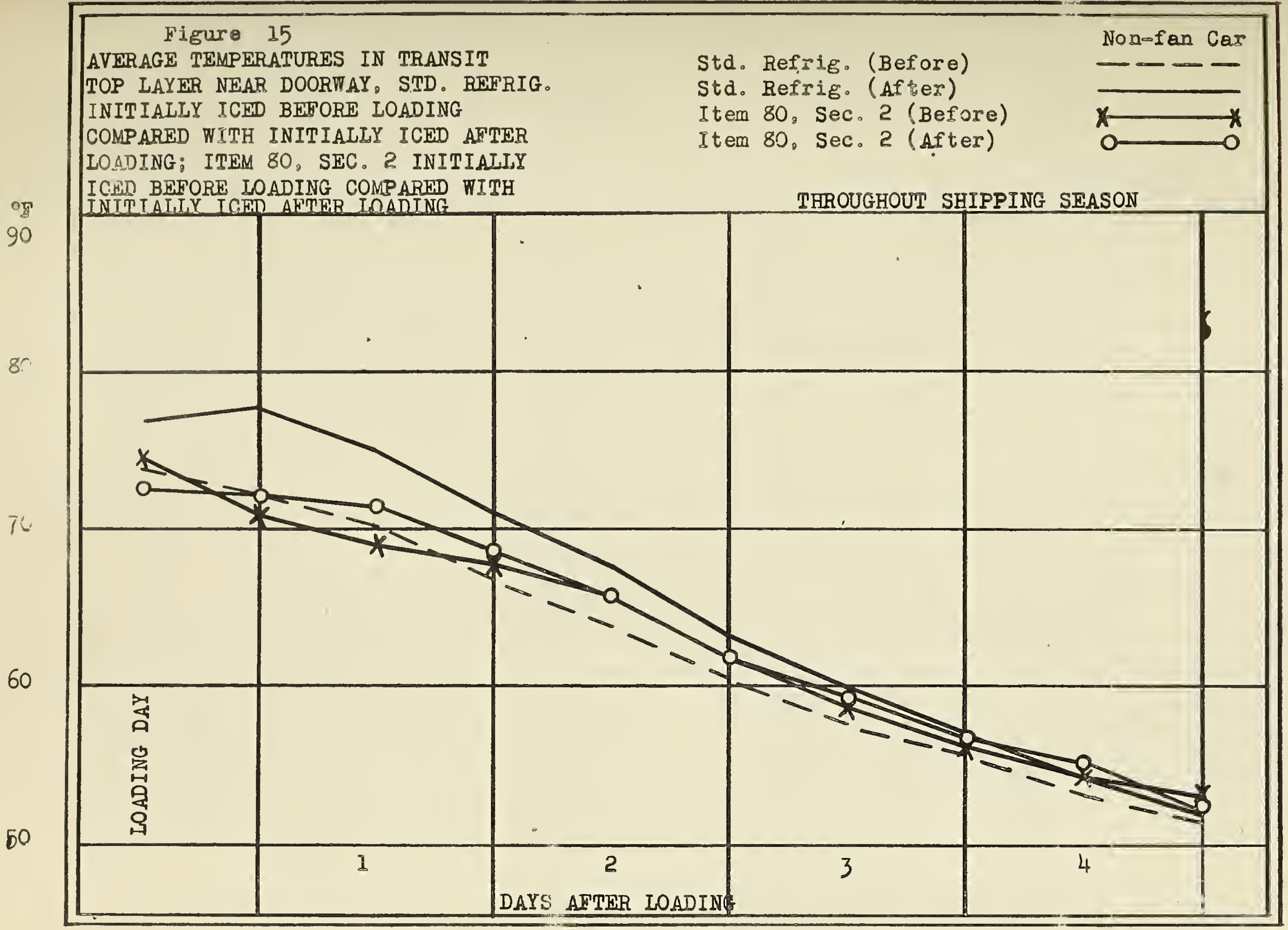


Figure 15

AVERAGE TEMPERATURES IN TRANSIT TOP LAYER NEAR DOORWAY, STD. REFRIG. INITIALLY ICED BEFORE LOADING COMPARED WITH INITIALLY ICED AFTER LOADING; ITEM 80, SEC. 2 INITIALLY ICED BEFORE LOADING COMPARED WITH INITIALLY ICED AFTER LOADING

THROUGHOUT SHIPPING SEASON

	Number of Tests	Initially Iced	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	DK* %	Plus 1 Week RB %	DK %
Non-fan Cars								
Std. Refrig.	9	Before	22891	6500	3.5	0.9	9.8	6.7
Std. Refrig.	9	After	18118	6500	2.0	2.1	4.5	10.5
Item 80, Sec. 2	17	Before	17588	3200	0.4	1.2	2.4	9.3
Item 80, Sec. 2	17	After	14171	3700	0.5	1.4	1.5	9.4

*RB signifies Rind Breakdown; DK, decay.

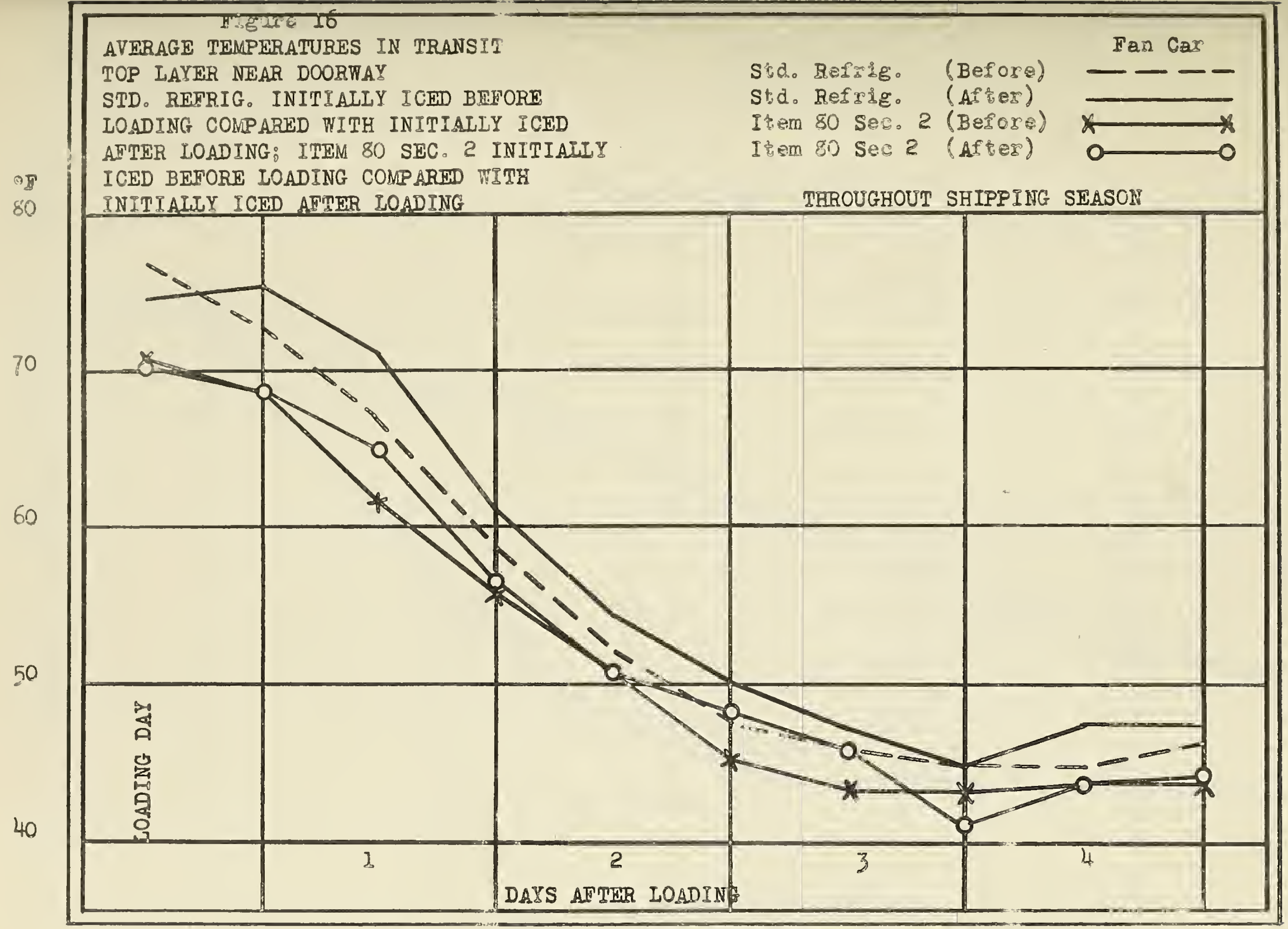


Figure 16

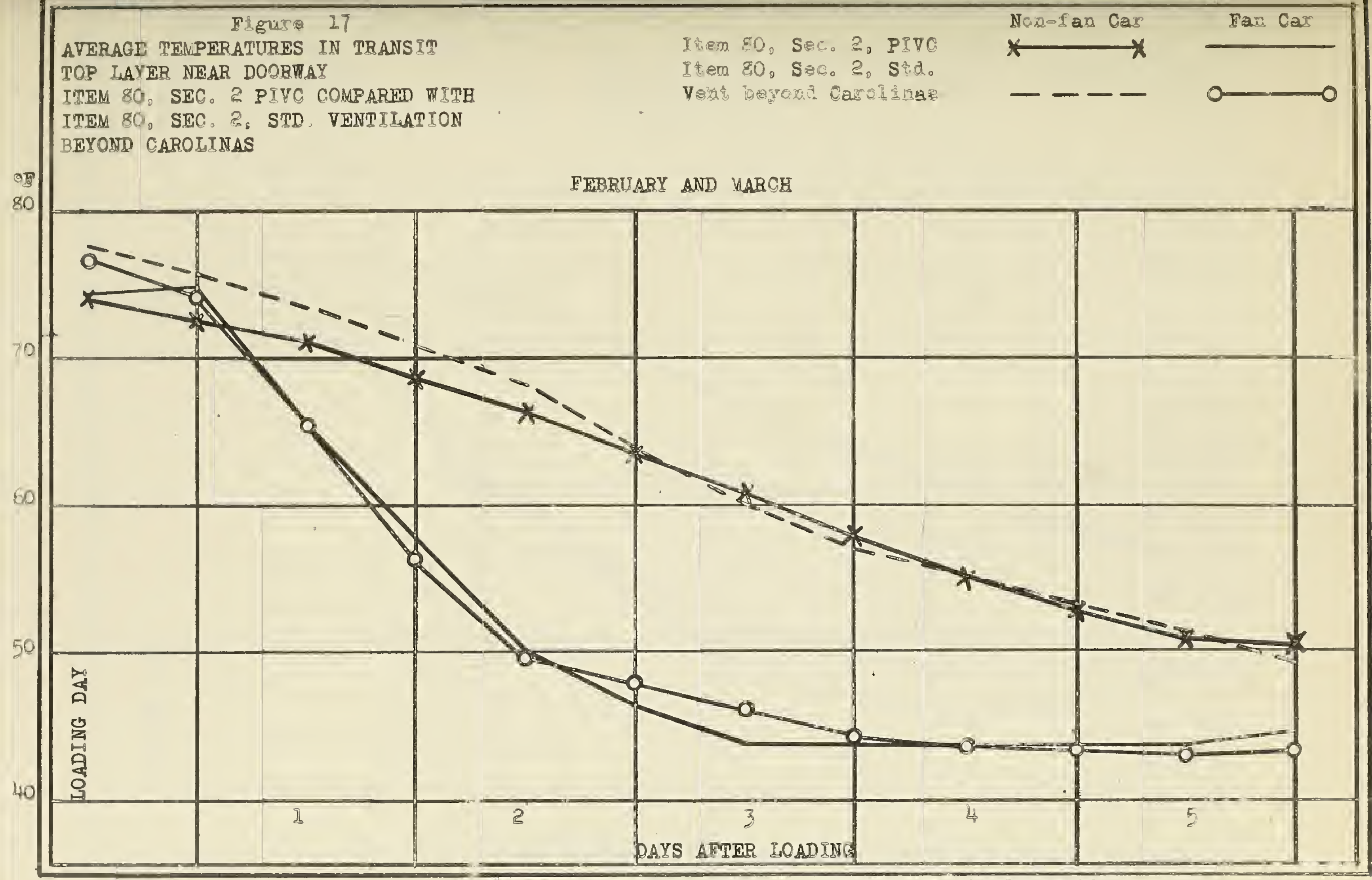
AVERAGE TEMPERATURES IN TRANSIT
TOP LAYER NEAR DOORWAY
STD. REFRIG. INITIALLY ICED BEFORE LOADING COMPARED WITH INITIALLY ICED AFTER LOADING; ITEM 80 SEC. 2 INITIALLY ICED BEFORE LOADING COMPARED WITH INITIALLY ICED AFTER LOADING

THROUGHOUT SHIPPING SEASON

	Number of Tests	Initially Iced	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 Week RB %	Plus 1 Week DK %
Fan Cars								
Std. Refrig.	10	Before	22130	5900	1.2	0.2	4.1	4.2
Std. Refrig.	10	After	21170	7100	1.5	0.5	3.5	6.1
Item 80, Sec. 2	12	Before	18354	4300	0.1	0.4	2.0	7.2
Item 80, Sec. 2	13	After	15215	3900	1.4	0.2	7.1	9.4

*RB signifies Rind Breakdown; DK, decay.

Figure 17
AVERAGE TEMPERATURES IN TRANSIT
TOP LAYER NEAR DOORWAY
ITEM 80, SEC. 2 PIVC COMPARED WITH
ITEM 80, SEC. 2, STD. VENTILATION
BEYOND CAROLINAS



	Number of Tests	Billed Wts.	Ice Supplied	Ice Remaining	Fruit Inspection at Unloading		Plus 1 Week	
		Lbs.	Lbs.	Lbs.	RB*	DK*	RB	DK
					%	%	%	%
Non-fan Cars								
Item 80 Sec. 2 PIVC	9	48153	16100	5100	6.7	1.8	12.5	16.3
Item 80 Sec. 2 1/	7	48773	16863	4100	2.6	1.8	4.7	10.8
Fan Cars								
Item 80 Sec. 2 PIVC	5	46746	17740	5200	0.0	0.7	5.9	7.8
Item 80 Sec. 2 1/	7	48707	15629	4200	0.7	0.1	2.2	2.2

1/ Std. Ventilation beyond Carolinas.

*RB signifies Rind Breakdown; DK, decay.

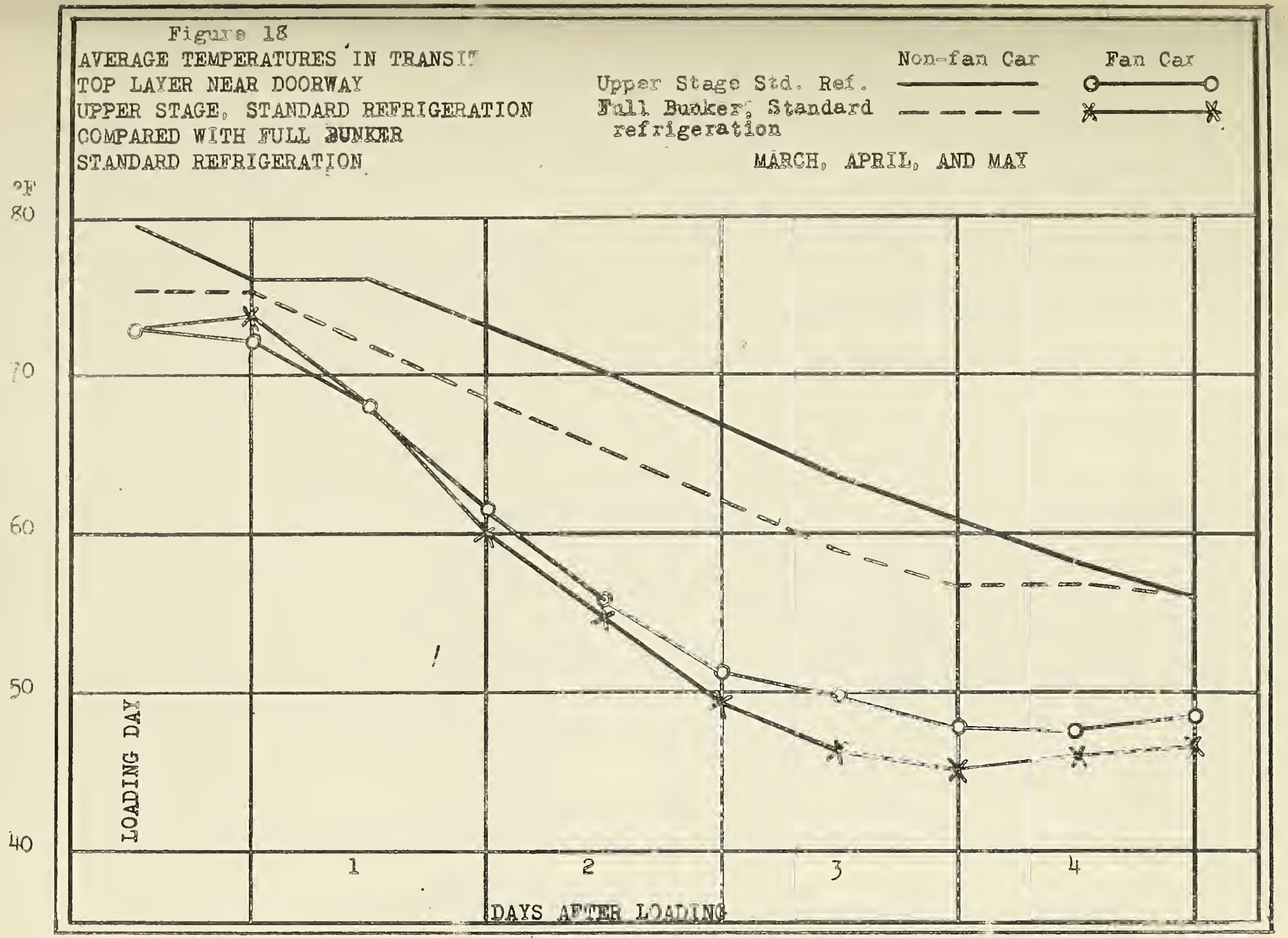


Figure 18
AVERAGE TEMPERATURES IN TRANSIT
TOP LAYER NEAR DOORWAY
UPPER STAGE, STANDARD REFRIGERATION
COMPARED WITH FULL BUNKER
STANDARD REFRIGERATION

	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	DK* %	Plus 1 Week RB %	DK %
Non-fan Cars								
Upper Stage Std. Ref.	10	49220	12920	2200	3.1	1.6	9.9	12.7
Full Tank, Std. Ref.	10	49741	21920	6400	2.1	0.7	4.6	10.2
Fan Cars								
Upper Stage Std. Ref.	13	49078	13362	2900	2.0	0.3	5.2	7.6
Full Tank, Std. Ref.	9	50254	22647	7500	1.5	0.5	4.2	7.4

*RB signifies Rind Breakdown; DK, decay

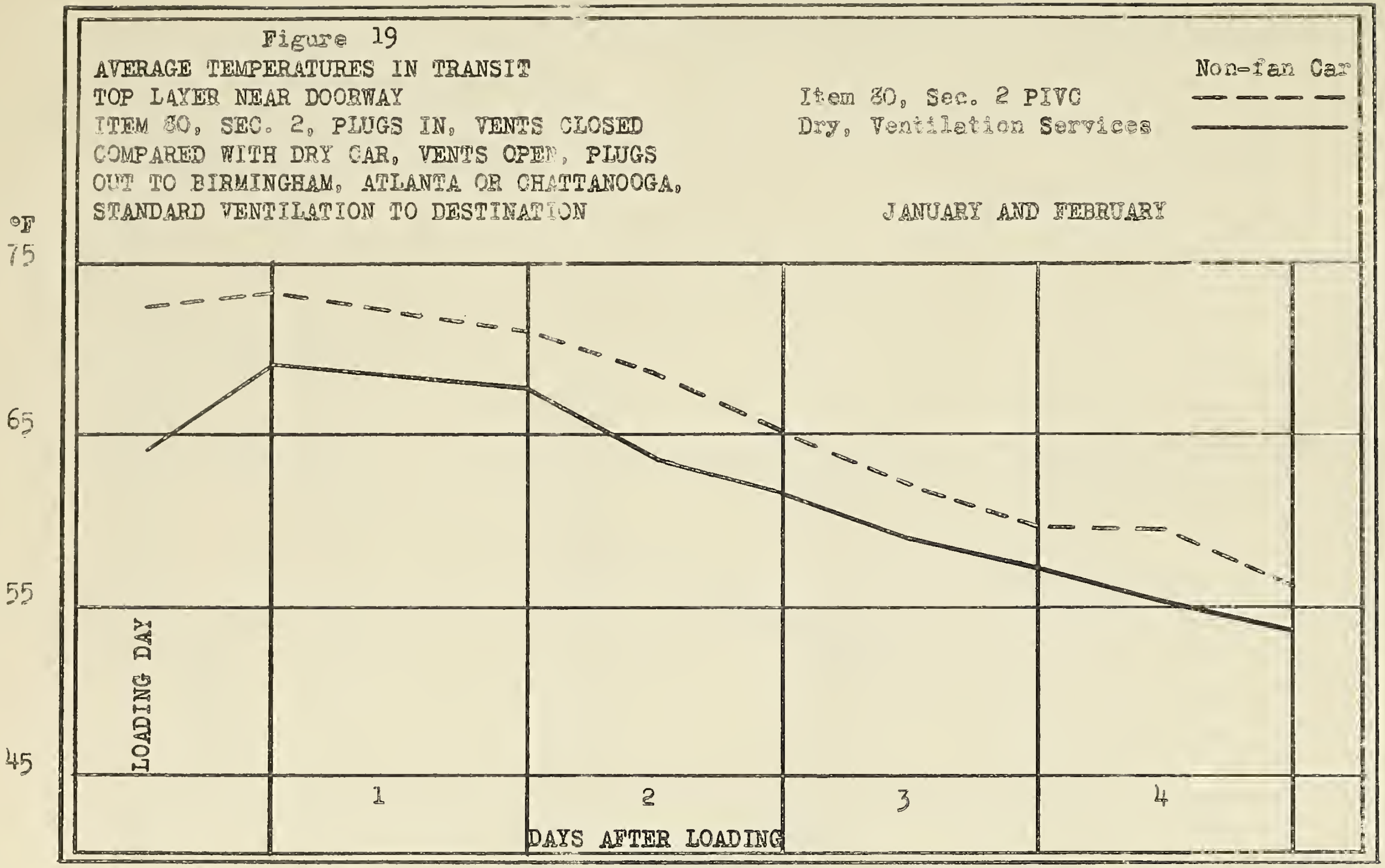


Figure 19
AVERAGE TEMPERATURES IN TRANSIT
TOP LAYER NEAR DOORWAY
ITEM 80, SEC. 2, PLUGS IN, VENTS CLOSED
COMPARED WITH DRY CAR, VENTS OPEN, PLUGS
OUT TO BIRMINGHAM, ATLANTA OR CHATTANOOGA,
STANDARD VENTILATION TO DESTINATION

JANUARY AND FEBRUARY

	Number of Tests	Billed Wts.	Ice Supplied	Ice Remaining	Fruit Inspection at Unloading		Plus 1 Week	
					RB*	DK*	RB	DK
		Lbs.	Lbs.	Lbs.	%	%	%	%
Non-fan Cars								
Item 80, Section 2, PIVC	9	48959	17178	3200	3.5	2.2	9.8	10.6
Dry, Ventilation Services	9	47542	none	none	1.2	2.8	3.7	15.0

*RB signifies Rind Breakdown; DK, decay.

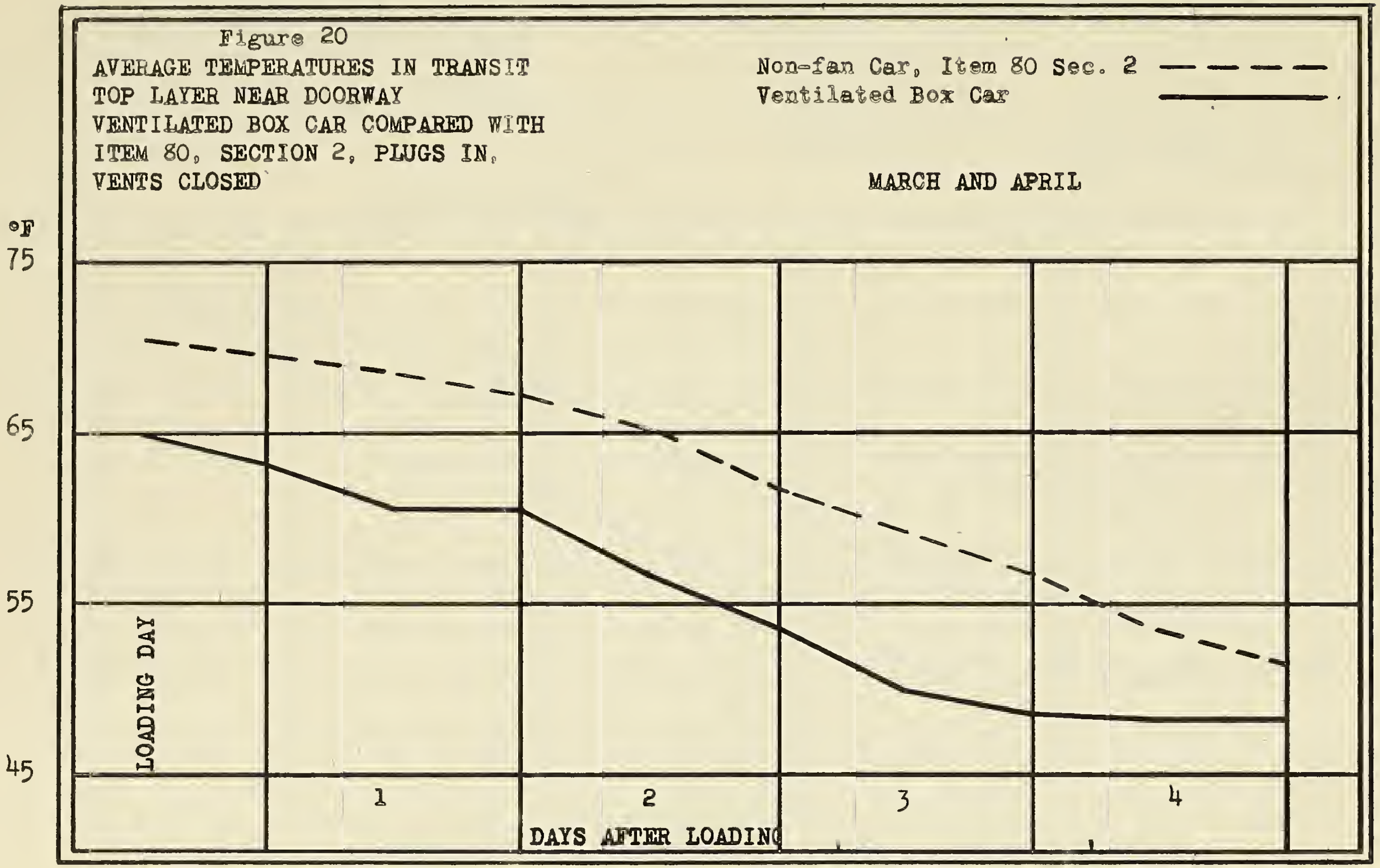


Figure 20

AVERAGE TEMPERATURES IN TRANSIT
TOP LAYER NEAR DOORWAY
VENTILATED BOX CAR COMPARED WITH
ITEM 80, SECTION 2, PLUGS IN,
VENTS CLOSED

MARCH AND APRIL

	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 Week RB %	Plus 1 Week DK %
Non-fan Cars Item 80 Sec. 2 PIVC	13	49659	15915	4400	1.9	1.7	5.2	8.6
Ventilated Box Cars Ventilation	11	51537	none	none	0.1	0.1	4.7	3.4

*RB signifies Rind Breakdown; DK, decay

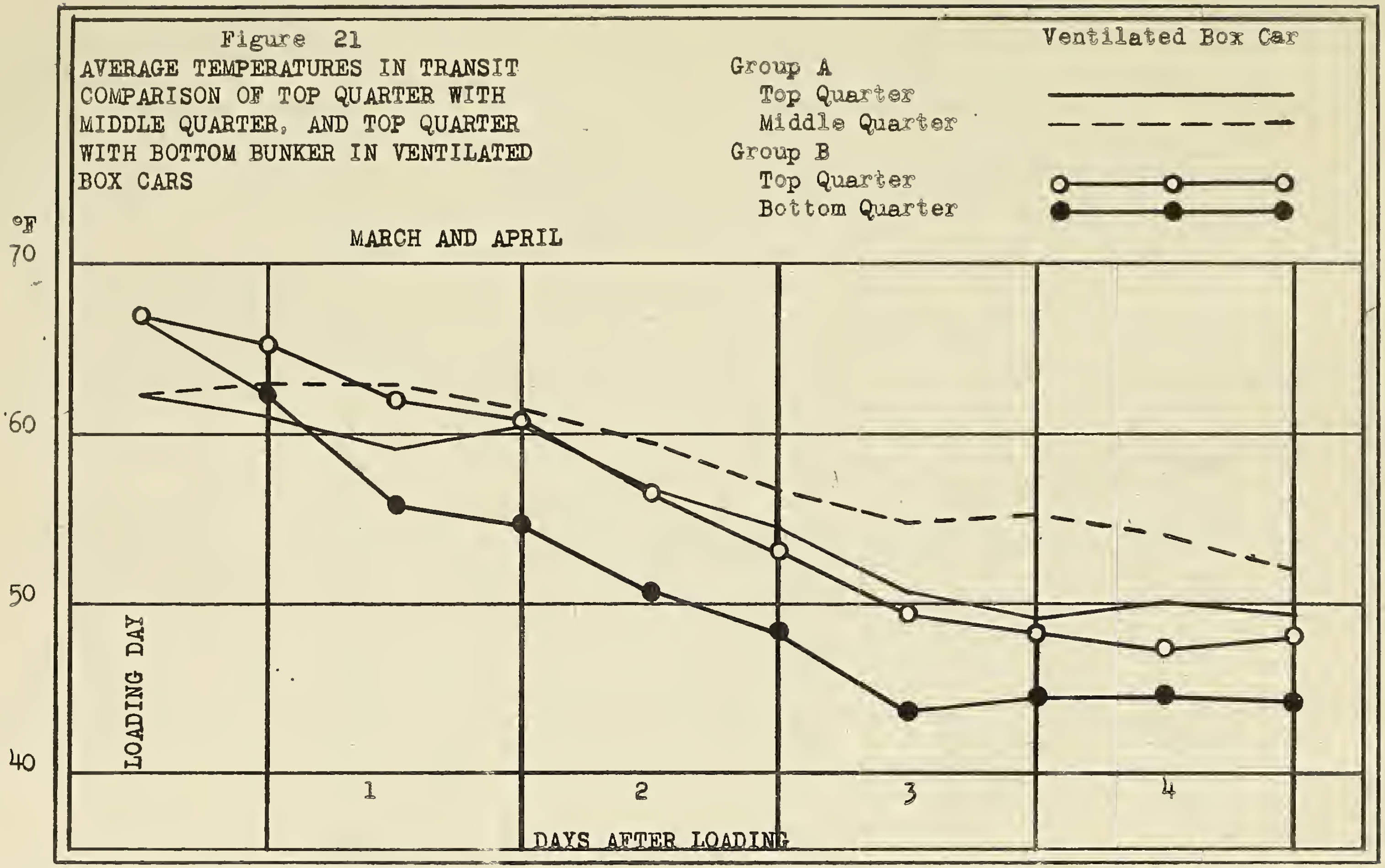


Figure 21
AVERAGE TEMPERATURES IN TRANSIT
COMPARISON OF TOP QUARTER WITH
MIDDLE QUARTER, AND TOP QUARTER
WITH BOTTOM BUNKER IN VENTILATED
BOX CARS

MARCH AND APRIL

	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 Week RB %	Plus 1 Week DK %
Ventilated Box Cars								
Group A-Top Quarter	5	52138	none	none	0.0	0.0	0.8	1.6
Middle Quarter	5	52138	none	none	0.0	0.0	2.6	4.0
Group B-Top Quarter	6	51037	none	none	0.0	0.0	6.6	4.1
Bottom Quarter	6	51037	none	none	0.0	0.0	4.8	2.2

*RB signifies Rind Breakdown; DK, decay.

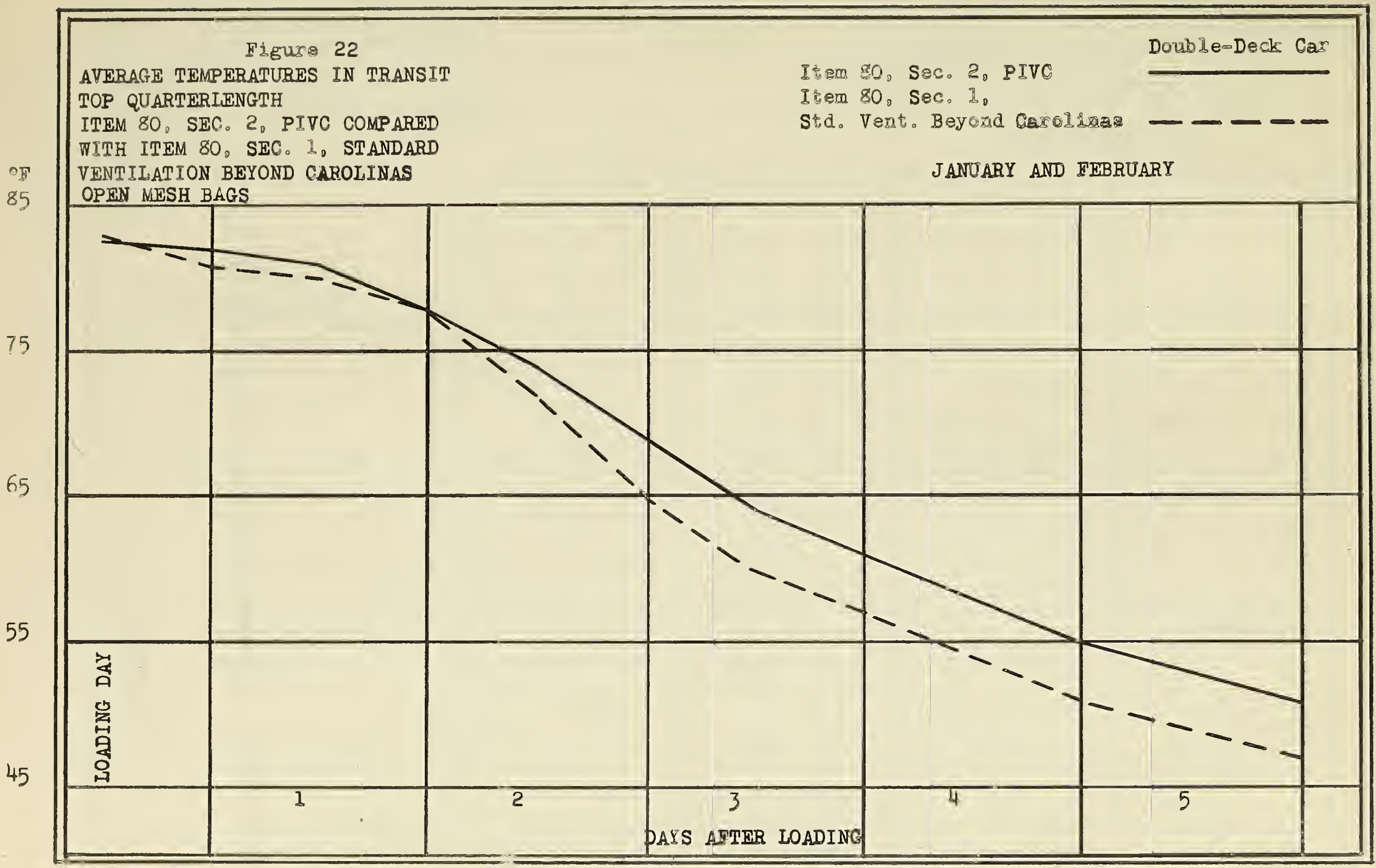


Figure 22

AVERAGE TEMPERATURES IN TRANSIT
TOP QUARTERLENGTH
ITEM 80, SEC. 2, PIVC COMPARED
WITH ITEM 80, SEC. 1, STANDARD
VENTILATION BEYOND CAROLINAS
OPEN MESH BAGS

	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	DK* %	Plus 1 Week RB %	DK %
Double-Deck Cars								
Item 80, Section 2	12	42689	15042	4300	15.1	2.4	27.9	10.0
Item 80, Section 1 Std. Vent. Beyond Carolinas	11	42948	6000	600	19.2	2.6	31.1	10.7

*RB signifies Rind Breakdown; DK, decay.

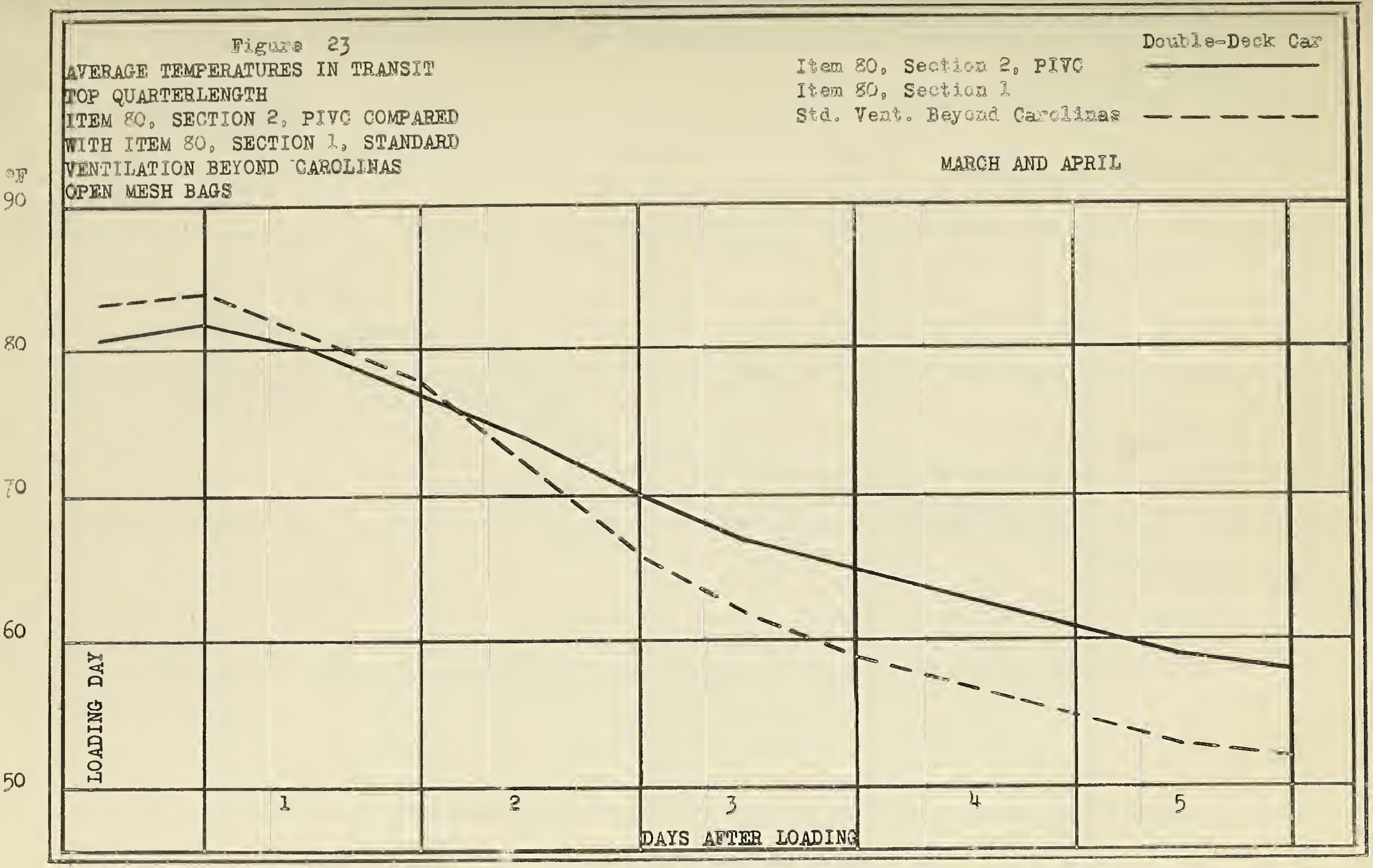


Figure 23
AVERAGE TEMPERATURES IN TRANSIT
TOP QUARTERLENGTH
ITEM 80, SECTION 2, PIVC COMPARED
WITH ITEM 80, SECTION 1, STANDARD
VENTILATION BEYOND CAROLINAS
OPEN MESH BAGS

	Number of Tests	Billed Wts.	Ice Supplied	Ice Remaining	Fruit Inspection at Unloading		Plus 1 week	
		Lbs.	Lbs.	Lbs.	RB*	DK*	RB	DK
					%	%	%	%
Double-Deck Cars								
Item 80 Sec. 2 PIVC	7	42354	15813	3200	5.7	1.0	10.8	7.8
Item 80 Sec. 1, Std. Ventilation Beyond Carolinas	6	42739	7000	700	5.7	0.6	4.8	6.0

*RB signifies Rind Breakdown; DK, decay.

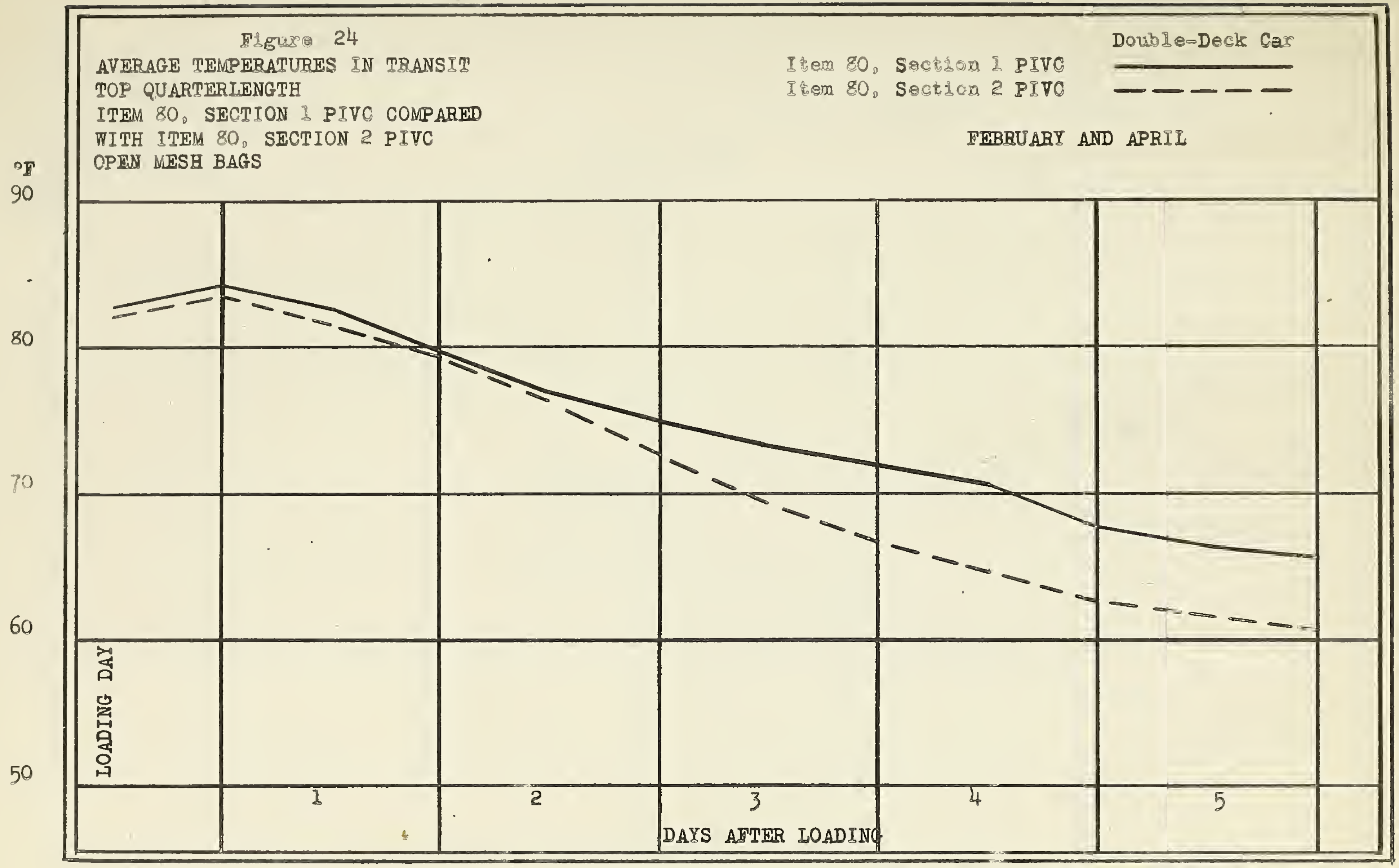


Figure 24

AVERAGE TEMPERATURES IN TRANSIT
TOP QUARTERLENGTH
ITEM 80, SECTION 1 PIVC COMPARED
WITH ITEM 80, SECTION 2 PIVC
OPEN MESH BAGS

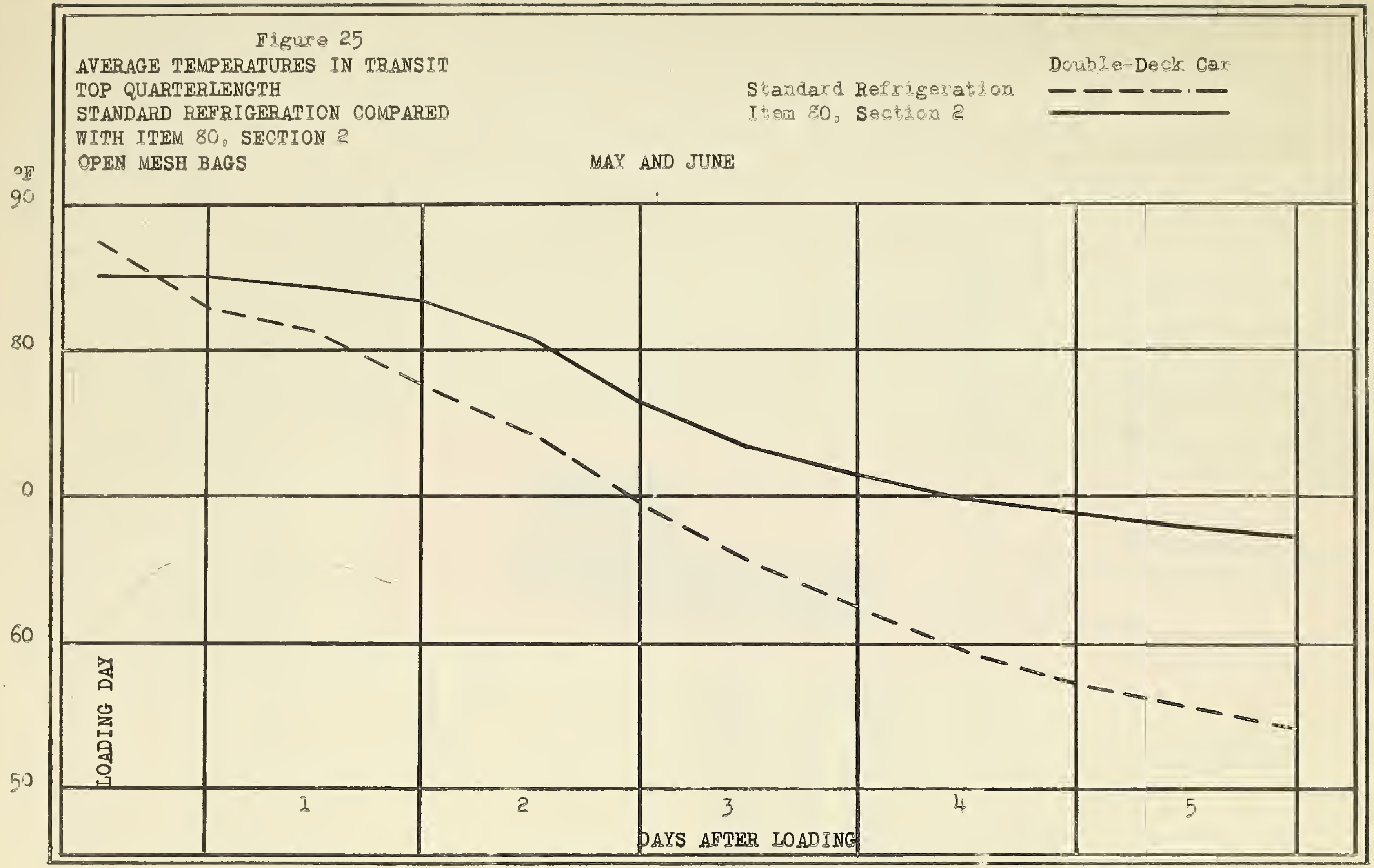
	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 week RB %	Plus 1 week DK %
Double-Deck Cars								
Item 80, Sec. 1 PIVC	5	42273	9320	0	3.9	7.8	8.0	23.0
Item 80, Sec. 2 PIVC	5	42596	16020	3200	12.9	2.1	17.9	9.9

*RB signifies Rind Breakdown; DK, decay.

Figure 25

AVERAGE TEMPERATURES IN TRANSIT
TOP QUARTERLENGTH
STANDARD REFRIGERATION COMPARED
WITH ITEM 80, SECTION 2
OPEN MESH BAGS

MAY AND JUNE



	Number of Tests	Billed Wts. Lbs.	Ice Supplied Lbs.	Ice Remaining Lbs.	Fruit Inspection at Unloading RB* %	Fruit Inspection at Unloading DK* %	Plus 1 Week RB %	Plus 1 Week DK %
Double-Deck Cars								
Item 80 Sec. 2	11	47935	17867	1800	3.4	6.2	4.0	25.6
Std. Refrig.	12	46100	21008	4100	0.6	2.5	3.3	19.4

*RB signifies Rind Breakdown; DK, decay.